The United States MILLER

Published by E. HARRISON CAWKER. { Vol. 12, No. 5. } MILWAUKEE, MARCH, 1882. { Terms: $1.00 a Year in Advance. Single Copies, 10 Cents.

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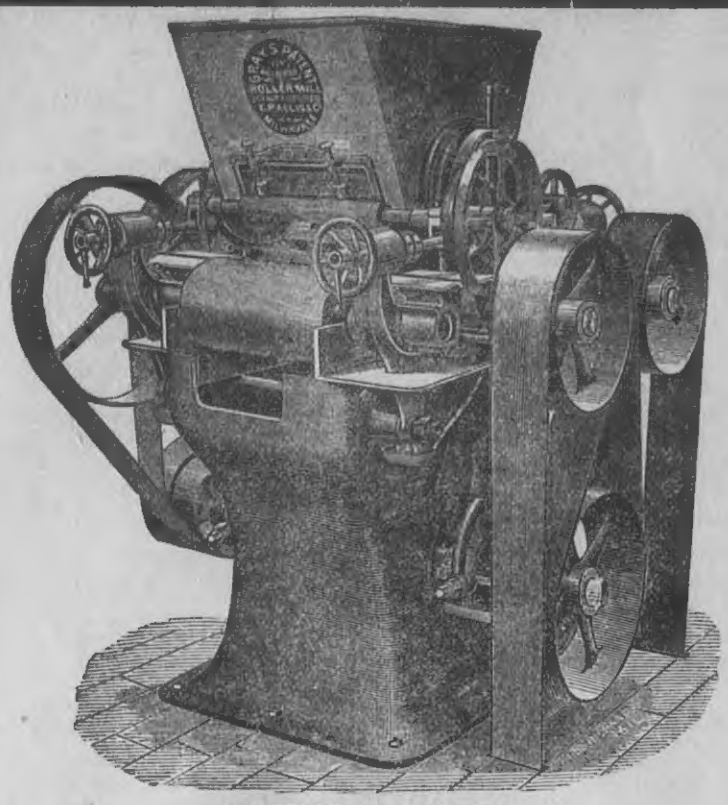

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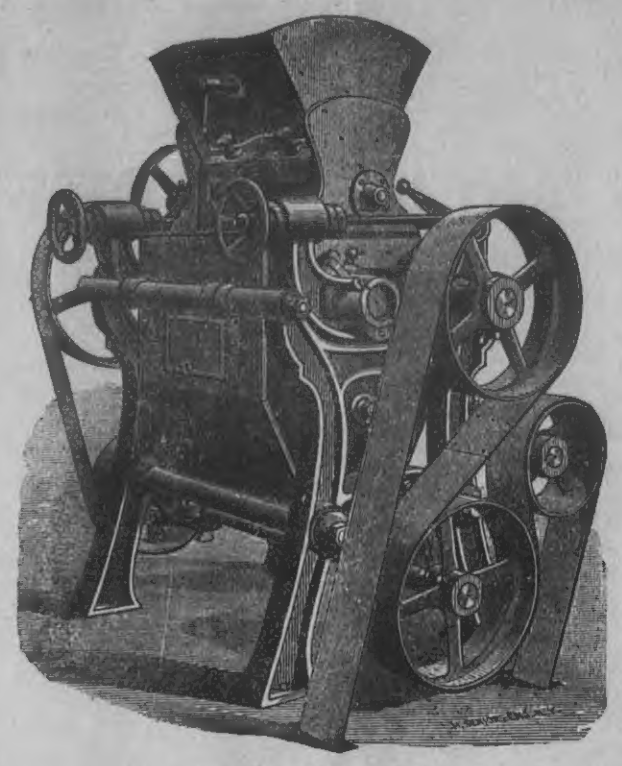

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[Written for THE UNITED STATES MILLER.]

Birkholz on Milling.

BY R. BIRKHOLZ, M. E.

THE CLEANING OF WHEAT.

It is impossible to make a clean and healthy flour from dirty wheat. The wheat, as it is brought to the mill, contains the following foreign substances, in variable percentage, which will color the flour: Loose dust, dust adhering to the berry, loose smut dust, smut adhering to the berry, beards or fuzz grown on points of the berry, cockle and other seeds, corn and oat kernels, shrunken, small or unripe kernels, sand and stones, pieces of wire (from wire binders), sticks and straws. The foreign substances found in raw wheat injurious to the health of the consumer are cockle and some other weed seeds, smut, and fungi grown on the wheat kernel, even though it be microscopically small.

All of these substances must be eliminated. When grinding wheat with stones, the cockle will produce black specks in the flour, and the prudent miller will anxiously seek to take out the cockle before grinding the wheat. When wheat is reduced on corrugated rolls, however, only *the conscientious miller* will eliminate his cockle, for the cockle bran is *not lacerated or pulverized* by the action of corrugated rolls, and it will not give black specks in the resulting product. The unconscientious—and I must confess that there are some—do not remove the cockle when grinding with corrugated rolls. They say, "The cockle flour improves the color of the wheat flour." What do such millers care for the poisonous action of the cockle flour mixed with the wheat flour, as long as it improves the color and enables them to run their mills without a cockle machine? It is self-evident that sand, stones and pieces of wire will injure the corrugations of the rollers or the dress of the stones. The pieces of wire found in wheat are from the wire-binding reapers, and it is indeed a blessing to millers that lately efficient binders have come largely into use, that use twine instead of wire. Straws and sticks will fasten themselves into the feeding apparatus of the rollers, and tend to impair the evenness of grinding.

The machines necessary for the elimination of the before-mentioned foreign substances, thoroughly, are a separator, cockle machine, smutter, magnetic separator, brush, and aspirator.

The separator will remove the loose dusts, seeds, oats, corn, sticks and straws, stones, small shrunken kernels of wheat, some wire and some cockle. The cockle machine will remove the balance of the cockle and the very small, shrunken and unripe wheat kernels and broken wheat. The smutter will polish the kernels, rub off the adhesive dust, pulverize the smut, and scour off the fuzz or tips of the kernels. There are three classes of smutters built. One class scours the wheat by dashing it against smooth surfaces and against itself, kernel against kernel; another class scours the wheat by rubbing it against corrugated surfaces, and the third class scours wheat by means of sand stones.

The machines of the first class are, in my opinion, the best, for they break but few kernels, polish well, and their capacity is large. Machines of the second class act too hard on the wheat—the bran is broken by the corrugations, kernels are split open, the flour magazine of the kernel is damaged and the flour rubbed out. The machines of the third class are also too severe in their treatment of the wheat. They tend to weaken the bran, produce too much smut flour, and their capacity is small compared with machines of the other two classes, while the power required to drive them is greater.

All three classes of these smutters tend to *rivet* the dust into the creases of the berry. This dust *must be removed*, and the simpler the construction of the mill the greater is the necessity of removing such dust flour. To explain: All of the best and dearest mills bolt the flour out of their *first* break of the wheat. This flour is indeed the poorest made in any mill. The kernels are opened in first break rolls, and the dust drops out of the crease. In small mills, when but four reductions instead of six are employed (to suit the pocket-book of the small miller), the first break must be set closer, and it does not pay to eliminate the first flour, as other good bakers' flour is made, along with the poor dirty flour. Now in such a mill it becomes an absolute necessity to employ a brush machine to brush out the dirt riveted into the crease of the berry by the smutter. For small mills, the combined smutter and brush is indeed very profitable. These machines first smut the wheat and then brush it. For larger mills it will of course be necessary to employ a *bona fide* brush machine, to finish the cleaning of the wheat. From this machine the wheat is spouted or elevated and spouted to the bin over the stones or first break rolls. It is good for large mills to take away the dust which is made by the rubbing of the kernels against each other and the spout during its passage to the bin. This can be done by making a cataract in the spout near the bin end and sucking air through the stream of wheat, or by employing some aspirators, which are constructed for that purpose, provided with five or more cataracts and suctions.

Wheat liable to contain pieces of wire must be passed over powerful magnets on its way from the smutter to the brush. Wires ought to be removed before the brushing is effected, in order to save the brushes from wearing away too rapidly.

Some spring wheat contains incredible quantities of cockle, and in order to avoid the overloading of cockle machines, it is advisable to put in between the separator and cockle machine a wire-rolling screen, clothed so as to let the cockle and small wheat drop through. The tailings of such a screen are large wheat, free from cockle. This may be passed right along to the smutter. The dust made by all cleaning machines should be sent to a dust-room; and I will here state that owing to the fuzziness and lightness of this smut dust, this dust-room ought to be, if possible, better than those usually employed for purifiers. The cloth ought to be self-cleaning and fine meshed, owing to the injuriousness of just that fine dust, which will pass even through the finest cloth. I think flannel is best to cloth such a room with, and there ought to be plenty of it. The smut dust can be mixed with the bran or shorts.

It is always a good plan to keep the wheat-cleaning machinery by itself—insulated and partitioned off from the mill proper,—for the reason that they produce a certain dust which is, as before mentioned, very injurious to operatives, as it is irritating to the lungs. Cleaning machines displace a great quantity of air, and will draw off a great deal of heat from the mill proper in cold seasons, if no dust-room is employed, and will render the mill very drafty. Cleaning machines are fast running machines, and are liable to cause fires. If the cleaning machinery is partitioned off from the mill proper by brick walls, insurance companies will give far lower rates than they otherwise would.

Mills having a high basement may best keep their grain cleaning machinery therein, as the machines are usually heavy and heavily driven, and in this place they are easy to attend without running up and down stairs. In mills with a capacity of more than 150 barrels of flour per twenty-four hours it is best to place cleaning machines one below the other, thus saving power in re-elevating large quantities of wheat.

In a winter-wheat mill having a basement and four stories above, place the separator in the attic, smutter on floor below, and brush on floor above grinding floor. A winter-wheat mill does not need a cockle machine so much as a spring-wheat mill, as winter wheat is singularly free from cockle as compared to spring wheat.

A four-story spring-wheat mill grinding wheat containing a moderate quantity of cockle ought to have the separator in the attic, cockle machine below, smutter below that, and the brush in the basement—keeping all cleaning machinery away from the grinding floor.

A three-story spring-wheat mill ought to have the separator in the attic, cockle machine in story above grinding floor, and the two heaviest machines, smutter and brush, in the basement. A spring-wheat mill grinding very cockly wheat containing pieces of wire, ought to have the separator in the attic, rolling-wire screen hanging under floor below, cockle machine standing on floor below, smutter on floor above grinding floor, and brush in basement, and so on.

It is the practice of the best mills of the country to arrange the driving of all cleaning machines, their elevators and conveyors, so that the whole combination can be stopped and started easily and while other machinery is running. Cleaning machines of large capacity are chosen, and are only run twelve to fourteen hours per day, *during daylight*. At night this dangerous machinery is allowed to remain idle. A suitable bin over the wheat stones or first break rolls should be provided.

Large mills get quite an amount of separated oats, corn, small shrunken wheat, cockle and broken but good wheat. Their practice is to take the cockle and poor shrunken wheat and grind it on a corrugated roll, and send the meal, without bolting, directly to the bran bin. The oats, corn and broken good wheat they grind in another finely corrugated roll; the meal is then sent to the scalping reel of the sixth break. This practice has been found to be very lucrative.

To sum up: The cleaning of the wheat is just as important a factor in the production of good and healthy flour, as the purification of the middlings. BE CAREFUL WITH EACH.

Milling Points.

ABOUT BUCKWHEAT.—A French authority (G. Le Chartier) says that frequently buckwheat straw is richer in phosphoric acid than the grain itself which is never the case with other cereals. A crop of buckwheat takes more fertilizing matter from the ground than other grain does if the straw is removed from the ground. Buckwheat straw rotted and used as manure is a valuable fertilizer for any grain crop. Buckwheat should be well hulled before it is passed to stones or rolls. Rollers with sharp carrugations have been used successfully for making buckwheat flour recently. Cranson's buckwheat huller is a good machine for the purpose. Old stock stone of a very porous nature should be used. The furrows should be smooth and have a fine feather edge. From 8 to 14 cracks per inch should be put in. About 60 pounds of flour should be produced from 100 pounds of buckwheat. It should be run through a No. 14 bolting reel after the first grinding and that which does not bolt through should be returned to the stones and reground and bolted again. A great deal of buckwheat is raised in the New England and Middle States and in the province of New Brunswick. It is however raised we beleive in all of the Northern and Western States to a greater or less extent.

CORN, (Maize) GRINDING. There is probably no better method of reducing (grinding) corn that with a pair of ordinary millstones. The dress usually adopted in the West where a 4 feet stone is used has 12 leading furrows with 4 inch draft; 12 second furrows laid off from a circle 12 inches in diameter and 12 short furrows laid off from a circle 24 inches in diameter. The furrows are deep at the back feathering out to the front and leaving a light catch at the edge of the land. The lands are cut at an angle of 45 degrees with the draft and about 1-16 of an inch apart.

REMOVING MILLSTONE GLAZE.—The Fry process for taking off the glaze of millstones, which was so much talked of a few years ago, was as follows: First the burrs must be put in perfect face, well dressed, out of wind, and in the best possible condition for grinding. They are then run a couple of hours until they become warm, taken up, and washed with aqua ammonia in the following manner: Take four ounces of aqua ammonia (spirits of hartshorn) and thoroughly saturate the stones with a good sponge, and let them stand over night. By doing this once a week, or oftener if necessary, the glaze will be kept off. His second method was to take two ounces each of borax, washing soda and muriate of ammonia, and dissolve them in a quart of warm water; then add cider vinegar. Now cover the stone with sand, and apply the solution with a sponge. Leave it on ten minutes, and then dry the stones thoroughly. This is said to harden the burrs so that nothing, not even garlic, can glaze them, and they will retain their natural temper and grit for weeks, and will not glaze.

TO KEEP MACHINERY FROM RUSTING.—Take ½ ounce of camphor, dissolve in 1 pound of melted lard, take off the scum and mix in as much fine black-lead as will give it an iron color. Clean the machinery and smear with this mixture. After twenty-four hours rub clean with a soft linen cloth. It will keep clean for months under ordinary circumstances.

TO OIL A MILL SPINDLE.—Somebody says: The best way to oil a mill spindle is to guide the oil through a small gas-pipe half an inch in diameter, from the outside of the curb down below the hurst frame to the bottom of the stone, and thence with an elbow to the bush, upward to a level with the top of the bush. This will thoroughly oil the spindle, and is not a very expensive arrangement.

SHARPENING MILL PICKS.—Emery wheels have been quite extensively used for sharpening millpicks. The best size of wheel for this purpose is said to be 8 inches in diameter by 1½ inches thick. A machine for the purpose of sharpening mill picks with wheel complete is in the market and can be purchased for about thirty dollars.

SHEAR'S a student of modern milling concludes that wheat should not be handled to tenderly in cleaning. "In twelve years experience" he says: "I have never seen wheat overcleaned. No smutter using steel or chilled iron surfaces has ever scoured wheat too much, if unbroken. The brush is a great help but it is not intended to take the place of the smutter."

WATERLOO, Iowa, has a new organization proposing to improve a water-power at the south part of the city. There is already one power improved there, and four large mills and factories in operation. The new power is to be formed by the building of a dam about 4,400 feet below the one now built, and from it a race two miles in length will be constructed through a neck of land, and emptying into the Cedar river again. This race will be 100 feet wide, and a fall of 7 feet will be obtained. The articles of incorporation allow a capital stock of $300,000, and it is proposed to go to work as soon as possible in the spring. The Cedar river at this point is about 600 feet wide, and is very rapid, so that it will furnish, when properly developed, almost unlimited power.

UNITED STATES MILLER.

PUBLISHED MONTHLY.

OFFICE NO. 118 GRAND AVENUE, MILWAUKEE, WIS.

Subscription Price.....$1 per year in advance.
Foreign Subscription.....$1.50 per year in advance.

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MILWAUKEE. FEBRUARY, 1882.

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THE UNITED STATES MILLER appears this month in an entire new dress of body type. We trust its improved appearance will gratify our many readers.

MILWAUKEE MILLERS like their brethern all over the West, complain of dull times a little but are looking forward to lively times after harvest.

EVERY flour broker or mill furnisher or any other person desiring to reach the flouring mill owners of America should purchase a copy of Cawker's American Flour Mill Directory for 1882. It contains 22,844 names and addresses. Price, Ten dollars per copy. Sent postpaid to any address on receipt of price. Address, United States Miller, Milwaukee, Wis.

☞ THE United States Consuls in various parts of the world who receive this paper, will please oblige the publishers and manufacturers advertising therein, by placing it in their offices where it can be seen by those parties seeking such information as it may contain. We shall be highly gratified to receive communications for publication from Consuls or Consular Agents everywhere, and we believe that such letters will be read with interest, and will be highly appreciated.

THE C. A Gambrill Manufacturing Company has nearly completed its new flour mill at the lower end of Smith's dock, Baltimore, Md. It is to be known as Patapsco Flouring Mill "B." The company runs two other mills, one of which, Patapsco Flouring Mill "A," is at Elliott City and the other at Orange Grove Station, Baltimore and Ohio Railroad. The new mill, which is built of brick, is 123 by 65 feet, and 78 feet high. It will have a capacity of 500 barrels per day, and will rank in completeness with any mill in the country. It has all of the most improved appliances, having been constructed on the roller system. The mill has twenty-three double sets of the Dawson Brothers' chilled-iron rolls, sixteen of of Smith's purifiers, six aspirators, ten dust-catchers, and two boilers of 160 horse-power each. There is a fine wharf property belonging to the new mill. The dock tower is capable of taking out 3,000 bushels per hour. The storage house, adjoining the mill proper, will hold upward of 120,000 bushels of wheat, all of which will be handled by machinery. It has twenty bins, each of which will hold 5,700 bushels of wheat, and there are besides two upper floors for wheat.

The Denchfield Patent Case.

We are reliably informed that the Executive committee of the Millers National Association have fully determined to legally contest the claims of the owners of the Denchfield Patent. The council for the Association upon examination of the case conclude that they have a good defense. On the other hand the Denchfield party claim that they have so far always been successful and that they know of no reason why they will not continue to be so.

Personal.

During the month of February THE UNITED STATES MILLER was favored with calls from the following persons connected with the trade:

Frederick Ogden, Esq., late of the firm of Esser, Ogden & Co., Buffalo, N. Y.

William F. Putnam, Esq., head miller for Hickox & Co., Cleveland, O.

M. H. Buck, Esq., Delafield, Wis.

Samuel Darrah, Esq., Stone Bank, Wis.

G. M. Marshall, of Kilbourn City, Wis.

Wm. Norman, Newburgh, Wis.

William McLain, of the Richmond Manufacturing Co., Lockport, N. Y.

W. C. Edgar, business manager of The *Northwestern Miller.*

Geo. B. Heckel, Chicago, representative of The Lockwood *Press.*

Mr. Glessner, of Thornburgh & Glessner, Chicago, Ill.

French Opinion favorable to Mill stones.

Charles Touaillon, the French milling engineer recently concluded a communication to the Paris *Echo Agricole* as follows: "We repeat that what for a long time has been done by rollers in Hungary, and more recently in some other countries, proves nothing in their favor; this is a system which takes us back to when *moture a la grosse* was in its infancy. The real end to be sought should be to obtain a single and straight grade at one operation; rollers give as many qualities as the number of grindings, which reaches ten or twelve. Rollers flatten and cake the middlings of soft wheat instead of dividing it. One should strive to make as fine a powder as possible in order to avoid making irregular or, what is in England called 'strong' flour, which yields a heavy and indigestible bread, and which could not be eaten were it not cut into infinitesmal pieces and covered with a considerable quantity of butter. Whatever may be said and done, it is only in making a fine flour, with a regularity in the bolting of it, that one can attain perfection in the art of milling. The demand for good bread will certainly advance with civilization, and those who do not follow in the steps of progress will be soon outstripped, and will be forced to return to good stones, and the outlay they may have incurred will be lost."

Re-Issued Patents.

A U. S. SUPREME COURT DECISION.

January 9th 1882 Honorable Justice Bradley delivered the opinion of the Supreme Court of the United States in a case appealed from the U. S. Circuit Court in Connecticut. We have not space to publish the complete text of the decision but it fully settles three points regarding re-issued patents as follows:

First, That where the only mistake suggested is that the claim of the original patents is not so broad as it might have been, the mistake, if it was a mistake, was apparent upon the first inspection of the patent, and if any correction was desired it should have been applied for immediately, and the right to have it corrected was abandoned and lost by unreasonable delay.

Second, That if a patentee who has no corrections to suggest in his specification, except to make his claim broader and more comprehensive, uses due diligence in returning to the Patent Office and shows how such mistake occurred, his application may be entertained; but it must be remembered that the claim of a specific device or combination and an emission to claim other devices and combinations apparent upon the face of the patent are in law a dedication to the public of that which is not claimed, and the legal effect of the patent cannot be revoked unless the patentee surrenders it and proves that the specification was so framed by real inadvertence, accident, or mistake, without any fraudulent or deceptive intention, and this should be done with all due diligence and speed.

Third, That it was not the special purpose of the legislation upon reissues to authorize the surrender of patents for the purpose of reissuing them with broader and more comprehensive claims, although under the general terms of the law such a reissue may be made when it clearly appears that an actual mistake has inadvertently been made, not from a mere error of judgment, but a real *bona fide* mistake, such as a court of chancery in cases within its ordinary jurisdiction would correct.

Our Chief Grain and Flour Ports.

There are only three ports in the United Kingdom which imports more than a million quarters each of wheat annually. Liverpool heads the list with an average of four millions, London follows with three millions, and Hull with about one million one hundred thousand quarters. The only other ports which exceed half a million quarters are Bristol, with an average of 750,000, Dublin 800,000, and Glasgow and Cork each about 500,000 quarters. In flour imports, Glasgow comes first, with a total for last year of 1,400,000 sacks (280 lbs.), or twice as much flour as wheat. Liverpool stands second with an average for the past three years of 1,000,000 sacks, while London receives about 850,000, and Leith, the next largest amount of 300,000 sacks. Hull, although the third largest importer of wheat, only imports 60,000 sacks of flour. Cork appears to be a specially favoured port, for, with an import of 500,000 quarters of wheat, it has not, on the average, received 1,000 sacks of flour annually. Taking the average of the past three years, we find that England and Wales imported annually 9,000,000 quarters of wheat, and 2,500,000 sacks of flour, the flour bearing the proportion of 15 per cent. to the wheat. Scotland imported 1,000,000 quarters of wheat, and 1,600,000 sacks of flour, the quantities of each being about equal. Ireland imported 1,600,000 quarters of wheat, and only 150,000 sacks of flour, the proportion of flour imports being only about 6 per cent. of the wheat imports. The Irish imports of flour are very low, but a portion of the Liverpool and Glasgow imports is re-exported to Belfast and Dublin.—*The Miller* (London).

Proofstaffs.

The proofstaff may be said to be the foundation almost of good milling with buhrs. The proof can always be rectified by putting two already proved staffs to it. The slate staff is the best, and it can be easily made. It may be made five feet long so as to be suitable for any size of stone, and it is not half so expensive as the iron staff, while it is entirely more correct, and is never known to vary. It ought to be at least two inches in thickness. It will never be affected by temperature, and in a large country like ours it is necessary to have a staff of this kind. The best iron staff cannot be wholly depended on, but must always be proved before useing, then rectify your staff to the proof, put a little oil on it very evenly distributed all over and reduce all the highest places on the staff until it shows an equal bearing on every part. In proving the stone place a piece of tissue paper under each end of the staff and one under the middle and keep the staff about three inches from the eye. The stone should be tried in this manner all around, and if correct it will hold all the papers so that they cannot be pulled from under the staff. In proving a new stone, place a screw with the head rounded to form a pivot for the staff to turn upon, in the eye of the stone; make a place in the staff about a quarter of an inch deep, lower the screw until the staff, if the stone is true, will swing round evenly.

The stones should always staff from the skirt with a good face and if the buhrs are very incorrect when the staff is laid on dry to try them, it would be well to rub them over with a piece of buhr. A good buhr block is far better than the corundum polishers. When the stones are staffed first only the very large spots should be knocked off with the pick, and two or three coats of paint should be aken off in this way, and then the dressing of the buhr will be easy and swift. Never allow the staff to cross the eye under any circumstances. If this is done it may take a week to dress a stone that could be dressed in a day. I used to face blocks fifteen years ago, and generally faced eight a day, at fifty cents each, which was more money than the builders could make, and it was done because I knew how to staff them.—*Millstone.*

California Wheat Overland.

From the Rochester Democrat-Chronicle.

The farmers of California produce a large amount of wheat not needed for home consumption. The surplus has been shipped to Europe by a long and, at some points, dangerous water route. Most of it has sought San Francisco for shipment, and has given employment and profit to many persons. But within the present month the course of California's outgoing wheat has been changed to a considerable extent, and the prospect is that the new outlet will assume very large proportions. The opening of the Southern railroad route to the Eastern States gave the wheat dealers a sharp thought, and the new idea is in process of rapid development.

San Francisco about the middle of the present month was startled by a telegram from Bakersfield, a point which taps great wheat valleys of the State, that from twenty to fifty cars loaded with wheat pass that point daily, bound east. Further information notified the San Francisco Board of Trade that on the 16th of the month there were upward of 400 loaded cars between Bakersfield and Lathrop ready for shipment to St. Louis. The *Morning Call*, of San Francisco, in noticing the outlet, says: "This is probably the first California wheat that ever left the State, except through the Golden Gate. This sudden change in wheat shipments is almost startling. What will be its effect on San Francisco? We think the loss of a portion of the grain business will not injure San Francisco, for the banking of the interior wheat shippers will continue to be done in San Francisco. The capital to move grain will be furnished from here; the Eastern and foreign exchange bills drawn against wheat will be negotiated here, and all the loss this city will sustain will be the handling, which is not very much. It was said of old, that all roads lead to Rome, and all interior facilities and new routes for transportation must eventually lead to San Francisco."

It is evident that if the new way of outlet should in all respects prove to be the cheapest and best, it will be quite a damper to certain San Francisco interests. Yet the San Francisco journals have a faint word of rejoicing for the California farmers, as "everything that helps California farmers," they say, "helps San Francisco." One journal says: "Whenever the great valleys of the Sacramento and the San Joaquin are prosperous San Francisco is prosperous. Reduced freight rates mean more money for the wheat-raiser, more improvements, and more supplies will have to be purchased in this city to meet new demands.

Just what effect this new movement is to have upon prices of wheat east of the Rocky mountains, and how it will affect certain shipping routes, remains to be determined.

New Publications.

HARPER'S MAGAZINE for February, 1882. Published by Harper & Brothers, N. Y. Subscription price $4.00 per year.

Harper's Magazine for March is full of handsome illustrations and notable articles.

THE CENTURY MAGAZINE The Century Co., New York, Publishers. Subscription price, $4.00 per year.

CONSULAR REPORTS, from Department of State, Washingion, D. C.

COMMERCIAL AND STATISTICAL REPORTS from the Treasury Department, Washington, D. C.

THE U. S. MONTHLY MAGAZINE, published by the U. S. Monthly Publishing Co., Lakeside Building, Chicago. Subscription price, $1.00 per year.

THE AMERICAN MAIL AND EXPORT JOURNAL, published by Howard Lockwood, 74 Duane Street, N. Y. Subscription price, $3.00 per year.

FENWICK & SWENERTON'S flour mill, at Exeter, Ontario, was destroyed by fire on February 8, with 3,000 bushels of wheat and 300 bags of flour. The loss is $21,000. The building is insured for $2000 each in the Western and British American, and $6,000 in the Phœnix of London. The stock is insured for $2,200 in the Queen, and $1 200 in the Royal. Smith Bros. millwright shop on the Canal was damaged by fire, on the evening of February 17th to the extent of about $500. Insured Messrs. Smith Bros. are now established in their new quarters on the *East Side.*

The Dearness of Cheap Machinery.

There are plenty of people who are always looking after good articles, but they do not want to pay a good price for these articles when they find them. They seem to be oblivious of the truth that good things cost money, and that the best class of labor and material is required in turning out superior productions.

A man starts out to purchase a piece of machinery; he wants it to do perfect and exact work; he wishes it to have the latest and best improvements, and to be capable of turning out work with rapidity. Such machines, of course, can be procured, but not for a mere song.

To produce them requires well-appointed works, an experienced management and skillful workmen. But these can only be obtained by the expenditure of large sums of money. It is, therefore, idle to expect that the work they produce should be as low in price as though the workmen were of the cheaper sort, and the works less expensive in their construction. But the would-be cheap buyers insist upon the maker of the better machinery placing it in competition with that produced in the poorer works by the poorer labor. One unfortunate disadvantage which the maker of the best machinery labors under, is his inability at times to show to the casual observer wherein his productions are better than another's. A great deal of work may be expended in the proper fashioning of intricate and delicate parts, or in fine adjustment, that may not be apparent to the eye, but is displayed only in the accuracy and perfection of the operation of the machine.

Every machinist knows how rapidly the expense runs up when employing the high-priced workmen in such fine operations, and he also knows that he can not get a perfect machine without such expenditures. But the cheap buyer comes along and says: "Why do you ask so much for your machine? I was offered one of the same kind for very much less than you demand?" Of course the dealer may contend that his is superior to, and that it will be more lasting and serviceable than the cheaper machine, but this does not satisfy Mr. Cheap Buyer. Because the castings, the fashioning and the painting of the poor machine look equally as well as the good one, he thinks there is no difference between them. Sometimes he is confirmed in his beleif by the advice of his foreman, who, himself, may not be a judge of good machinery.

Doubtless some manufacturers are content to work for a smaller margin of profits than others, and sometimes, a good judge of machinery can make a saving by comparing prices, but we believe actual experience will demonstrate that in nine cases out of ten, the man who is always looking for cheap-priced machinery pays a relatively dearer price than one who seeks for the best article that he is able to buy. Good tools and machinery, as we have said. command a good price, but they are permanent investments which always yield a good interest. Good tools and good workmen yield the best attainable results in the factory, and it is the poorest policy to hire cheap labor to run cheap machinery, if good work is expected as the result.

Many and many a manufacturer has congratulated himself on his shrewdness in saving a few hundred dollars in purchasing machinery, who has, in fact, lost thrice the sum saved in the difference in the effectiveness of the machinery which he did buy, and that which he could have procured by paying the higher price.

Any good mechanic will verify the assertion that machinery which is constantly getting out of order, and that never does accurate work, in those cases where accurate work is needed, is dear at any price; and yet, there are plenty of shops and factories fitted out with just this kind of machinery, which was purchased because it was cheap.

A manufacturer of this city, desirous of procuring a machine that would make a difficult cam, went to a manufacturer and asked him what he would charge for getting up such a machine as he wanted. The price, which seemed to him a very high one, was named, and after some reluctance and an attempt at bantering, the machine was ordered. A few months after it was taken home and in operation, the maker called on the purchaser to see how he liked it.

In response to an inquiry, the purchaser said: "When I ordered the machine, I thought I was paying you a high price, as it was double what I had been offered a similar machine for, but after getting the machine home, and seeing the work it performs, I am free to tell you I am perfectly satisfied, and would pay double the price rather than be without it. I have no machine that begins to compare with it in my shop." This instance, which has hundreds of parallels in this city, is sufficient to practically illustrate the point we are urging, that good machinery is always good, while cheap machinery may not always be cheap.

There can be no objection to a man setting out to buy poor machinery at a poor price, if he knows what he is buying, but it is extremely foolish for him to buy a cheap and poor article with the belief that he is obtaining a good one.—*Industrial World.*

Scale and Foaming in Boilers.

Most all water contains vegetable, earthy and solid matter in solution; those which occasion the greatest trouble are probably sulphate and carbonate of lime, oxide of iron, magnesia, alumina, and silica, and are found in greater or less proportion in waters of different localities. They are capable of being precipitated by heating water to a high temperature, as in the case of the steam boiler, when the precipitated salts settle, covering the tubes, sides and bottom of the boiler with a thin coating for each quantity of water heated, which, if not properly treated, will soon form a hardened scale very difficult to remove. The best preventive of scale is probably a good filter-heater, in which the feed-water can be raised to a temperature sufficiently high to deposit the matter held in solution, in the filter of the heater, before entering the boiler. A practice which facilitates the making or hardening of scale in boilers, is that of blowing out the water under high pressure. The only time to open the blow-cock when under steam is in the morning before starting the engine; a small percentage of sediment may then be blown out, but it should only be continued for a few moments at farthest.

When the boiler is to be emptied it should, if circumstances will allow, stand until the brick-work, water, etc., become quite cool; then the blow-cock can be opened, and while the water is running out, or immediately after it is out, take off the man-hole plate, and with a hose wash the sheets and tubes well while the sediment is still soft. With this treatment very little scale will adhere to the iron, but all that does should be dislodged as soon as possible, and on every occasion, by scaling bars, chisels, and hammers. Any sediment which the washing fails to remove should be scraped out before refilling the boiler. In cases where blowing out is compulsory, it should be done with as low a pressure as practicable. Water should be run out whenever it shows signs of being dirty; about once in two weeks is sufficient, as there is no use of emptying the boiler of water which has made its deposit and is comparatively good, to replace it with that which contains matter in solution to form new scale.

The great objection to scale is, that being a non-conductor of caloric, it prevents a large proportion of the heat of the furnace from entering the water, the heat escaping up the chimney, causing a waste of fuel and decreasing the evaporative power of the boiler.

With a heavy deposit of scale there is great danger of the iron which is in contact with the fire becoming burned, as the scale interposes a barrier to the radiation of the heat, also separates the water from the iron.

Foaming—Is a mixture of steam and water, and is the result of violent ebulition or agitation. It is caused, first, from poor circulation, owing to too great a number of tubes and flues, having insufficient spaces between them for the rise of the steam bubbles from the surfaces on which they are generated, and their rapid replacement by the surrounding water. A second cause is a contracted steam space; and thirdly, muddy or mucilaginous substances in the water.

Sometimes foaming is the result of carrying the water too high, in which case it should be blown down to its proper level.

When caused from the poor circulation, or from defect in the design of the boiler, to remedy it the engine would probably have to be throttled or cut off closer, the fire dampened with coal, and the pump or injector started before the trouble would cease.

Foaming caused by poor circulation is the result of the undue relation of temperature between the steam bubbles and the water, the excessive high temperature of the bubbles causing them to rise violently, carrying the water with them. When caused by mucilaginous substances the only remedy is changing the water.

The objections to foaming are the difficulties of ascertaining the water level and the danger, when violent ebullition occurs, of knocking out the cylinder heads, or otherwise damaging the engine. Water is made manifest in the cylinder by a peculiar knocking at the end of the stroke, and by a decreased speed of the engine.—*H. L. Stellwagen, in Mechanical Engineer.*

A Novel Steam-Ship.

In a new steam-boat now building upon the Hudson, an attempt is being made to produce a boat that shall be self-righting, that shall be very fast, and that cannot sink unless entirely torn to pieces. The boat is comparatively small, as it is intended only for an experimental or model boat. If successful, it is intended to build ocean steam-ships upon the same principle. It appears that the inventor's aim is to make a self-righting boat by carrying the sides over the deck in the form of a dome. The side frames are made continuous and meet over the center of the hull, or, in other words, the frames begin at one side of the keel, rise directly at an angle of about forty-five degrees to the water-line, and then curve inward over the deck and back on the same lines to the keel. A section of the hull taken in the center is thus of a wedge shape, with a sharp edge below and rounded top above. This wedge form is preserved through the entire length of the hull. There are no hollow lines in the boat, and the sharp, overhanging bow is intended to part the water near the surface and to form a long, tapering wedge. The widest part of the hull is exactly at the middle, both ends being precisely alike. This is quite different from the flat bottom and straight sides, with comparatively bluff or rounded bows, of the ordinary ocean steam-ship. The boat is intended to be much deeper aft than forward, and the deck will be much higher above water at the bows than at the stern. There will be no houses or raised constructions of any kind on the deck, except the dome-shaped pilot-house, the ventilators, and the smoke-stacks. There will be an open railing around the center of the deck, so that it can be used as a promenade in pleasant weather or whenever the seas do not break over the boat. The object of this unbroken dome-shaped deck is to enable the boat to throw off all waves that break over the bows or sides in rough weather.

It is thought that, instead of shipping tons of water and retaining it on deck till it can be drained off, the boat will shed or throw off the water from the long, sharp bows and open deck, and will at once relieve herself of the weight of the water. Waves striking the rounded deck will have no hold on the boat, and their force will thus be spent harmlessly. The sharp wedge-shape and rounded top of the hull, and the fact that even when fully loaded the center of gravity will be below the water-line, makes the model self-righting. From experiments with a small model, this claim of the inventor seems to be clearly proved. In laying out the boat, only the spar deck will be used for passengers, the main deck and all below being intended for cargo, coal, and engines. The state-rooms will be arranged along the outside, each room having a port in the side of the boat, while the ceiling will be formed of the curved deck above. The saloons will be the whole width of the ship, and on the spar deck. For lighting the saloons there will be sky-lights in the center, and as these in rough weather may be covered by the seas that sweep over the deck, they will be very strong, and will be air-tight. To secure ventilation there will be steam-fans, kept in motion at all times, and maintaining a good circulation of air through every part of the boat. For this purpose the fresh air will be taken through wind-sails on the deck, and the exhaust air from the rooms will be turned into the blast used in forcing the boiler fires.

No boats are to be carried on deck; the life rafts and boats will be kept in an apartment under the domed deck at the stern, and when they are to be launched, doors will be opened in the deck and the boats launched in the usual way from davits through these doors. The pilot-house will be at the bows, and will be entirely inclosed. It will not rise much above the deck, and will be entered from below.

There will be no masts or sails, as it is intended to depend wholly on the engines for propulsion. In constructing the hull, to secure great strength, three heavy trusses, or "hog frames," are to be placed on the keel, each one rising to the spar deck and securely fastened to the side frames of the boat. The ceiling will be double, and placed diagonally on the frames. In the larger steam-ships, the absence of sailing power will be compensated for by two extra engines and two supplementary screws, that can be employed in case the larger screw is lost or the main engines break down.—"*The World's Work,*" *in* THE CENTURY *for March.*

The Block System.

Frank L. Pope, the well-known patent expert, says: The most perfect description of the block signal is that known as the automatic system. The two rails of a stretch of track the length of the desired block are part of an electric circuit. So long as there is no metallic connection between the two rails a magnet at the signal post holds up the signal, meaning that the block is clear. But the moment a train rolls on the track connection is established between the two tracks by means of the wheels and axles of the cars, and the danger signal is displayed. When the train rolls off the block the connection is broken and the danger signal disappears. This system is in use on the Fitchburg railroad between Boston and Waltham; on the Eastern railroad between Boston and Salem; on the Old Colony road, and on the Pennsylvania road between Altoona and Cresson. On the Fitchburg road it has worked perfectly for the last three years, costing but little and doing the service to the complete satisfaction of the company. On some roads the ringing of an electric bell replaces the more perfect telegraph system used on the Pennsylvania road between New York and Philadelphia.

The great advantage of the block signals over every other kind of signals is that the engineer knows where and when to look for the signals, whereas through inattention he may not perceive a man standing at the side of the track swinging a lantern, especially if the steam of the engine is blowing in the engineer's face. But an engineer that is accustomed to look out and see that the block signal is all right will never miss it. Trains can now be brought to a stop so quickly by means of the Westinghouse brakes that the danger of collision can be almost certainly averted by the prompt display of danger signals. It has been repeatedly proved that when the rails are dry a train running at the rate of twenty-five miles an hour can be stopped in 210 feet—about the distance of a short city block. Going at the rate of thirty miles an hour a train cannot be brought to a stop within 300 feet. When the rails are damp 40 per cent. must be added to the distance that a train will run before stopping.

Centrifugal Reels.

An announcement on another page will, doubtless, attract attention, for it gives notice of a new departure made by the widely known Geo. T. Smith Middlings Purifier Company, of Jackson, Mich. The company has been granted, as will be seen by reference to the notice signed by Morritz Martin, of Bitterfeld, Germany, per his attorney, a sole and exclusive license to manufacture and sell the centrifugal flour dressing reels, heretofore made by Mr. Martin, in the whole of the United States and Territories, the patentee, Martin, reserving to himself only the right to complete and sell such machines as are already in process of construction.

The Martin patents are the earliest granted in this country on centrifugal machines, and parties interested will do well to examine into the claims allowed on them before placing orders. The licensees for this country claim that the Martin centrifugal flour dressing reel has more than four times the capacity of the ordinary reel, and will make clear flour and a clean finish on stock that can not be treated in the common reel without loss, no matter how much silk it is passed over. It is specially adapted to handling soft, reground material, full of light impurities, whether from rolls or stones. It is indispensable to a close finish in any system of gradual reduction milling, and will improve the quality of the low grade flour at the same time it makes the offals cleaner. It makes a clean seperation on caked and flaky meal from smooth rolls, which no other style of reel can do. It can be used to advantage as a complete system of bolting, to the exclusion of the ordinary reel.

We commend to the careful reader a perusal of the advertisement and an application to the Geo. T. Smith Middlings Purifier Company, Jackson, Mich., for descriptive circulars and price lists.

UNITED STATES MILLER.

E. HARRISON CAWKER, EDITOR.

PUBLISHED MONTHLY.

OFFICE, No. 118 GRAND AVENUE, MILWAUKEE, WIS.

SUBSCRIPTION PRICE.—PER YEAR, IN ADVANCE.

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Bills for advertising will be sent monthly, unless otherwise agreed upon.

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[Entered at the Post Office at Milwaukee, Wis., as second class matter.]

MILWAUKEE, FEBRUARY, 1882.

We respectfully request our readers when they write to persons or firms advertising in this paper, to mention that their advertisement was seen in the UNITED STATES MILLER. *You will thereby oblige not only this paper, but the advertisers*

FLOUR MILL DIRECTORY.

Cawker's American Flour Mill Directory for 1882, is now complete and ready for delivery this 31st day of January, 1882.

It shows that there are in the United States 21,356 flour mills and in the Dominion of Canada 1488. The mills in the United States are distributed as follows:

Alabama, 388; Arizona, 17; Arkansas, 234; California, 209; Colorado, 52; Connecticut, 309; Dakota, 44; Delaware, 96; District of Columbia, 7; Florida, 81; Georgia. 514; Idaho, 18; Illinois, 1258; Indiana, 1163; Indian Territory, 3: Iowa, 872; Kansas, 437; Kentucky, 642; Louisiana, 41; Maine, 220; Maryland, 349; Massachusetts, 363; Michigan 831; Minnesota, 472; Mississippi, 297; Missouri, 942; Montana, 20; Nebraska, 205; Nevada, 10; New Hampshire, 202; New Jersey, 445; New Mexico, 28; New York, 1942; North Carolina, 556; Ohio, 1462; Oregon, 129; Pennsylvania, 2786; Rhode Island, 47; South Carolina, 205; Tennesee, 620; Texas 548; Utah,129; Vermont, 231; Virginia, 689 Washington Territory, 45; West Virginia, 404; Wisconsin, 780; Wyoming, 3; Total, 21,356.

The directory is printed from new Burgeois type on heavy tinted paper and is substantially bound. It makes a book of 200 large pages. The post offices are alphabetically arranged in each state, territory or province. The name of the mill, the kind of power used and the capacity of barrels of flour per day of 24 hours are given wherever obtained which is in thousands of instances. This work is indispensible to all business men desiring to reach the American Milling Trade.

Price Ten Dollars per copy on receipt of which it will be sent post paid to any address. Remit by registered letter, post-office money-order or draft on Chicago or New York made payable to the order of E. Harrison Cawker, publisher of THE UNITED STATES MILLER, Milwaukee Wis.

THE publication office of *Leffel's Mechanical News* has been moved from Springfield, O., to No. 110 Liberty street, New York.

MANY FARMERS in Maine have become rather discouraged of late years in trying to raise crops of small grain. One of the principle difficulties is the scarcity of farm help.

"DEAL HOUSE" is the name of a new hotel at Bucyrus, O. It is named after M. Deal, the well known mill-furnisher of that city. We acknowledge receipt of invitation cards to the opening ball, Feb. 13th.

WHEN editors fight duels, they mean business. A dispatch from Guadalajara, Mex., says that Senors Morelo and Sevorito, rival editors, fought a duel there yesterday with pistols. Both fired and fell dead simultaneously.

THE Simpson & Gault Manufacturing Co., of Cincinnati, O., succeeds the firms known as Simpson & Gault and the Straub Mill Co. The new company has been incorporated under the laws of Ohio. The organization was effected January 14th, 1882.

ALBERT HOPPINS, editor and publisher of the *Northwestern Miller*, has sold out his interest in that paper to C. M. Palmer. We know not yet, what new path of glory our friend Hoppin will tread, but wish him the best of good luck in whatever enterprise he may embark.

POSTMASTER GENERAL HOWE revoked so much of the postal regulations as requires flour to be inclosed in sealed envelopes before being put into metal boxes for transmission in mails, and flour is declared not to be included among articles which, if not properly secured, might damage other contents of mails.

THE recent fire in New York which burned out so many publications, also destroyed the offices of the *Scientific American* and *Scientific American Supplement*, but as their printing was done in another building, where also their plates were stored, they are not at all crippled, but go right along as usual. Their business office is now at No. 261 Broadway, corner of Warren street, New York.

THE MINNESOTA STATE GRANGE, at their recent meeting in St. Paul, adopted resolutions severely denouncing Minneapolis Millers' Association by which most of Minneapolis wheat is purchased for the exclusion of other purchasers from the market and keeping down prices. The Grange also adopted an appeal to the railroad companies to cooperate with farmers to secure a freer and open market and fair competition for grain.

STILL ANOTHER ADDITION in the line of valuable inventions comes to public notice in the form of a new and improved gradual reduction machine for the manufacture of flour by the new process. Mr. Chas. Kropp, of Milwaukee, the inventor, has shown his drawings and specifications to a number of city millers for their inspection, and all agreed, that it is a first class machine and will rank high in the future.

MILLER BROS. & MITCHELL have a large establishment at No. 110, 112, 114, 116 King street, Montreal, Canada, where they do all kinds of machinery and millwright work. They are the sole Licensees for the Dominion for Gray's Noiseless Patent Roller Mills and Gradual Reduction machines and are having marked success in introducing them. The millers in all portions of the Dominion of Canada are fortunate in possessing this enterprising establishment which can furnish them at short notice with anything in the milling line.

THE following circulars from the Treasury Department, of interest to millers near the Canadian line, have been issued. On the exportation of flour wholly manufactured from imported wheat, drawback will be allowed at the rate of 89 cents per barrel, less the legal retention of 10 per centum. The rate heretofore prescribed, of 75 cents per barrel, is hereby superseded. The collectors of customs will see that proper arrangements are adopted by the mills within their respective districts, where flour may be prepared for exportation with benefit of drawback, to prevent any admixture of domestic grain to the improved wheat at any stage of conversion into flour.

Cincinnati "Ozone".

A Cincinnati company styled the "Prentiss Preserving Company", have recently been advertising very extensively what they claim is "simply and purely Ozone". They send packages to all parts of the country to parties ordering it, at the price of $1.00 or $2.00 per package. To quote from their advertisement "Ozone—a new process for preserving all perishable articles, animal and vegetable, from fermentation and putrefaction, retaining their odor and flavor." The chemist Robert E. Warden has examined this wonderful compound, and in his report to the Ohio Mechanics' Institute says: "It thus appears that the "Ozone" as sold, consists essentially of about 19 parts of flowers of sulphur mixed with one part of lampblack, and scented with ground cinnamon, or something closely resembling it."

Two dollars per pound is rather high for this mixture, and the company will doubtless make huge profits for a while. It is said that they send out hundreds of packages daily in answer to orders.

(Written for the United States Miller.)

Gleanings from the German Milling Papers.

ACCORDING to the "*Techniker*" belts can be kept well on pulleys, if they are coated on the inside with a mixture of colophony (rosin) and linseed oil. The mixture should be so proportioned as to dry quickly. The belts will not slip off from the pulleys even if rather loose, and they will do more work when loose, if coated with this preparation, than if they are not coated and tight.

MUSTY bread, covered with fungi should never be fed to cattle. It is poisonous and like musty oil-cake produces colic and swelling of the belly, constipation and inflamation of the bowels, which, if severe, may cause the death of the animal. If it is neccessary to feed musty bread to animals, boil it first thoroughly. This will destroy the fungi.

THE use of rye flour in America is comparatively insignificant. The native American eats wheat bread almost exclusively. Rye bread is only consumed by the immigrant. Considering the enormous immigration of late years, one is lead to the belief, that rye will be soon in greater quantities and that the demand for rye flour will increase and that more mills will be devoted to grinding rye.

As the price of rye itself is very high and as this cereal will grow well and develop fully in the United States it is certain that the market for rye flour is bound to fulfill the most sanguine expectation. Further, there is no doubt but that if the process of grinding rye is ameliorated and improved as much in America as the grinding process of wheat has been—rye flour will become a first class paying article of export for American millers. Even now some of the poorer grades of American wheat is mixed with our rye and ground together into rye flour as the rye harvest has been rather poor in some parts of Germany and we Europeans, especially Germans are bound to have rye bread on our tables.

The celebrated Borsig mill in Berlin grinds the rye in 6 reductions on sharp corrugated rolls and purifies rye middlings, grinding the coarser kinds on smooth iron rolls and the finer kinds and dust middlings on stones. They have placed upon our markets an elegant, clear, white rye flour, which is sold at high prices even in our neighboring states. This Patent rye flour from this mill is celebrated for its color. It is as white as the so called American "second patent" wheat flour.—(American millers—think about this.)

OATMEAL. It is strange that our country, (Germany) has so long got along without more extensively employing the flour from oats or oat meal. In England, Spain, France and America the value of this easily digested food, especially endawed with strengthening and nourishing qualities has been long known and these nations spare no pains to secure oatmeal as pure and as well ground as possible. Oatmeal cooked with water, milk or beef tea is often the only nutriment that will keep the life in babes, whose mothers are not blessed with Natures milk of a sufficient quantity or quality. The oat flour surpasses by far in nutritious qualities all other starchy preparations which are sold under a score of names, for oatmeal builds up ones bones and sinews, whilst starch only produces spongy fat. The reason is on account of the great amount of gluten it contains. As this flour tastes well, babes take it easily if cooked in the proper manner and a certain aromatic flavor which emanates from it does away with the posibility of disliking it when eaten too often. We call the attention of all parents of weak children to the strengthening properties of oatmeal gruels. Fine oatmeal is seldom seen in our German markets even though the demand for it is perceptible. We trust that these lines will encourage some millers to make such and supply us with it. We feel confident that it would soon become an article of consumption of considerable importance.—*German Milling paper.*

If the course oatmeal, brought upon the American markets, were crushed on iron rolls, the flour bolted out through No. 11 cloth, middlings repurified and then ground on porcelain rolls—the result would be an elegant strong, white and pure oat flour, which indeed would sell very well. We know of a miller who tried to grind oatmeal on a sharp corrugated roll, blowed away the hulls, bolted off the middlings and flour, reground the coarser tailings on another fine corrugated roll and ground the middlings on iron rolls. This was done experimentally on hand rolls and by hand sieves. The result was very good indeed.—*Editor.*

THE musty smell of heated and slightly spoiled wheat can be removed by smutting the same with pulverized charcoal, which is afterwards removed by the wheat brush machine. This operation must be performed when the wheat is dry and the atmosphere not too damp. After wheat is so treated it can be ground into nice white flour without any musty smell, provided the decomposition of the wheat has not proceeded too far.

THE largest driving belt of leather was recently made at Berlin. It was 72 inches wide, double, and weighed 3500. 200 oxhides were required from which to make it. This belt was ordered for use in a German starch factory, to transmit 500 horse power.

A. MUENTZ, a German milling expert, in his recently published book says: "Cereals exposed to the air emanate a greater quantity of carbonic acid than those kept in nearly air-tight vessels. It was ascertained by analysis that oats lost 7½ per cent. more of the weight than the equal quantity thereof stored in a deep bin with closed top. Corn, having been exposed to the air during sixteen months, had lost 10 per cent. more in weight than corn stored in a deep elevator bin. The loss is attributed partially to spontaneous combustion, oxygen having free access to the cereals, and to mechanical reduction in rubbing off dust from the kernels during the frequent reiteration of shoveling over the the masses in order to prevent heating. By this it is proven that wheat ought to be stored in deep bins, rather than spread over the mill floor to the depth of two or three feet.

French Method of Copying Drawings.

A patent which has been obtained in France by M. Tilbet for taking copies of drawings, etc., in any color and on any kind of paper, is described as follows: The paper is dipped first in a bath containing 1½ ozs. white soap, 1½ ozs. alum, 2 ozs. English glue, ½ oz. precipitated albumen, 1-10 oz. glacial acetic acid, ½ oz. alcohol 60°,25 ozs. water. It is then dipped in a second bath, containing 2½ ozs. burnt umber, ground in alcohol; 1 oz. lampblack, ½ oz. English glue, 25 ozs. water. The paper is now sensitive to the action of light, and must be kept in the dark. If the paper is to be prepared for negative copies, it is dipped in another bath similar to the second, in which umber is substituted by black. For colored positive pictures, black is substituted by red, blue, or any other color required. The drawing which is to be copied is placed in a copying frame, with the negative paper above. In clear weather it will be sufficient if exposed for two minutes. After the exposure, the negative is dipped in water. The drawing then appears white, and is left to dry. The positive copy is taken by placing the negative on the glass, and the positive paper over it. After two minutes' exposure, this is dipped in water, an the black dissolves.

Industrial Education.

The experiment is to be made of introducing industrial education into Girard College. The Russian system, adopted in the Boston Technological Institute after its exhibition in this city in 1876, has been selected. It aims at teaching the principal processes in various trades, and not at producing salable commodities of any kind. It was Stephen Girard's purpose that the children should be apprenticed, on their leaving the college, to some trade. The break-down of the apprenticeship system has abrogated this part of his plan. For many years it has been found impossible to obtain such places for them; and, where they have been apprenticed, in compliance with his will, the arrangement in many cases has been more nominal than real. The new plan carries out the spirit of his bequest, although the method is different. The children will at least learn the use of their hands, as the first step to the production of useful work. Meanwhile, our grammer schools go on teaching the whole body of the city's children the industry of the clerk. Days, months, years, are spent on lessons in mercantile arithmetic and writing; and then, at the end of all, we wonder why so many want places at a desk, and so few at the workbench!—*The American.*

THE boiler in the Jewell Flour Mills at Brooklyn, N. Y., exploded February 16th killing Gilbert Stephens the engineer and seriously wounding two others.

Improvements in the Manufacture of Flour and the Removal of Husk and Germ.

(From the Millers' Gazette and Corn Trade Journal, London.)

Although the importance of the entire rejection of all particles of husk and of the germ is becoming more and more recognized amongst millers, there are many who not only believe that the bran and the germ are of great nutritive value, but that the latter improves the quality and the color of the flour. Other millers again, who believe that the germs ought to be rejected, say that they do reject it by grinding the wheat on stones, and by subsequently treating the middlings on smooth rollers. They contend that the germ is of such tough material that it cannot possibly be reduced to the same size as the more brittle flour producing semolina, during its passage through the stones.

The germ or germ-particles cannot therefore pass the meshes of the silk reel, and are delivered with the middlings at the tail end. If these middlings will then pass over the smooth rolls the germs or germ particles will be flattened and thus be finally rejected.

Although there is some justification in this assertion, and although there can hardly be any doubt that the germ particles will remain larger than the semolina particles, even the most ardent supporters of stone milling will not deny that the tearing and rubbing action of the rough surfaces of the stones must inevitably detach a certain amount of germ powder from the outer layers of the germ, so that although part of the germ still remains larger than the flour particles, some part of it has been ground fine enough to pass through the silk meshes and is therefore not rejected.

Such millers often mention the fact, that at the time when they used to grind some old and very dry beans together with the wheat in order to attract the moisture produced during low grinding, the beans were always returned at the tail end of the silk, because they were not reduced to the same size as the flour particles on account of their great toughness. But those millers never ascertained if *all* the beans were so returned; we should say not as part of them were ground fine enough to mix with the flour, and although there is no doubt that the flour produced by such means appeared to be superior to that ground in the ordinary way, the procedure is objectionable. No doubt a great part of the moisture was absorbed, but, on the other hand, a certain amount of albuminous ferment, chiefly legumine, was introduced into the flour.

Such presence of moisture and of albuminous ferments has a most important influence on the baking quality, and on the color of the flour, which we will explain further on.

Although the construction of the wheat berry, and the situation of its different components have been often explained in the milling journals, it will be necessary for our purpose to shortly repeat them here:

The wheat berry consists of a body of starch cells, surrounded by the gluten cell layer, or embryous membrane and five different layers of vegetable fibre. These latter do not contain any nutritive substance in a digestible form. The gluten cell layer consists of comparatively large cells filled with a number of small cells. According to one view these cells contain gluten, a nitrogenous, and therefore a flesh-forming albuminoid, and the thick skin of these cells is impervious to the gastric juices of man and carnivorous animals, but not to the longer action in the stomach of herbivorous animals. According to another view, the gluten cell layer does not contain gluten or, indeed, any albuminous matter; its chemical composition is not yet finally ascertained, and that although it might contain nitrogenous substances, these are indigestible both for man and beast. Mr. H. Mege Mauries, on the other hand, has proved that this layer contains phosphate of chalk, fatty phosphoric bodies, soluble cerealine, and insoluble cellular tissue. The chief properties are its imperviousness to water charged with any mineral salt, its so-called contact action, through its presence and its action as a ferment. If the embryous membrane is present in a dilution of starch, such as the dough for bread-making, and if it is subjected to a certain point of temperature, it will cause a conversion of the starch into dextrine and glucose, thus injuring the baking quality of the flour. Even if all cerealine is extracted from the embryous membrane, the simple presence of its tissue will cause a conversion of starch into dextrine. This phenomena is a well proven chemical fact, and it is not only caused by the presence of cerealine, or the tissue of the embryous membrane, but also by sulphuric acid, hydrochloric acid, by the contact action of malt, by simple moisture at a high temperature, and by nitric acid. All albuminous substances have also this property of converting the starch into dextrine but generally only after the commencement of decomposition.

The body of starch cells consists of a large number of cells filled with starch grains and gluten. The outer starch cells contain more gluten and have a thicker skin than the central cells, which shows very little gluten and have a very thin skin. As is well known, starch forms fatty substance during its digestion in our food and, therefore, tends to promote heat in our animal body.

The germ, or embryo, consists of a great number of very small cells, which, through their density and their oily contents, cause its great toughness. These cells surround the root of the coming wheat plant, and they give the first food to the root after germination.

According to Stoechhardt, the wheat germ shows the following chemical components:

Starch	15.2
Albuminoids	25.3
Fatty substance	9.4
Gum and sugar	8.7
Cellulose	6.1
Ash	3.8
Water	11.5
Total	100.0

Prof. Kick gives the following analysis of the entire wheat berry:

Components.	Limits.	Medium Value.
Starch	55 to 67	62
Dextrine	5 " 10	7
Gluten	1.0 " 20	13
Cellulose	1.5 " 2.3	1.6
Fatty matter	1 0 " 2.5	1.2
Salts	1.4 " 2.9	1.7
Water	12 " 16	13 5
		100.0

According to analysis made by Professor Cameron, ordinary wheat bran shows the following components:

Starch, etc	47.98
Albuminoids	16.29
Water	14.77
Cellulose	10.66
Oil	4.30
Mineral ash	6.00
	100.00

Numerous analyses of wheat and its products have also been made by O. Dempwolf but as they are made with Hungarian wheats they differ slightly from the above tables, which give the mean average.

If we examine the analysis of bran we shall at once see that by our present modes of milling we cannot avoid leaving nearly 50 per cent. of the starch on the bran. Now, according to F. Kick, the starch body of the wheat berry amounts to 82 per cent. of its total weight, and therefore the husk, with its embryous membrane and germ, amounts to 18 per cent. In the "Pester Walzenmuehle" the following percentages of wheat products were obtained:

Pure middlings and three first grades of flour	18.724
Flour IV. and V	32.682
Flour VI. and VII	22.224
Flour VIII	2.576
Bran and pollard, etc	18.516
Smut dust	1.290
Loss	3.988
	100.000

From this we can glean the fact that, as about 50 per cent. of the bran is starch, and as 18 per cent. is separated from the flour, only about half the husk (husk and starch amounting to 18 per cent. of the weight of the wheat) is rejected, even by highly perfected machinery. The other half of the bran has been ground into flour, and is chiefly found in the lower grades from IV. to VIII. Only a very small amount has been rubbed off in the smutter, etc.

Mr. O. Dempwolf also gives a table of the flours, etc., mention in the last table, as follows:

Per-centages		Water	Ash	Gluten	St'rch
18.742	Flour from middlings and the 3 first grades	10.60	0.41	11.70	70.00
32.682	Flour IV. and V.	10.50	0.60	13.30	67.20
22.224	Flour VI. and VII.	10.70	0.96	15.40	63.50
2 576	Flour VIII.	9 50	1.55	14.90	61.00
18.516	Bran and pollard	10.70	5.46	14.30	43.60
1.290	Smut dust	9.20	2.65	15.20	.....
87.00	Stone flour	10.50	1 00	14.40	65.60

The stone flour mentioned in this table, was made by one passage through the stones, and by removing 13 per cent. of bran.

If we compare these values of chemical components of the different flours, we shall find that the stone flour is about equal to roller flour V. in its contents of water and starch, but that it contains more gluten and more mineral ash. Its comparatively large percentage of mineral ash shows that a large percentage of branny particles must have been in the flour, and consequently also a large percentage of cerealine, which will have the tendency to convert part of the starch into dextrine, and which will cause an excessive amount of lactic fermentation during the panification process, thereby causing the decomposition of a large amount of gluten into several ammoniacal products. These facts have been so fully proved by Mr. Mége Mouries, that it is unnecessary for us here to say more about the relative nutritive value of stone flour and roller flour.

We only want to state that the more effective the *entire rejection* of the *bran* and of the *germ* is accomplished in any mode of milling the more durable will be its products and the better will be its baking quality.

If we consider the different modes of milling with regard to their efficiency in accomplishing such perfect separation of bran and germ, we shall find that the gradual reduction system is the most effective. In low grinding a large amount of bran is rubbed so small as to mix with the flour, and only very little germ is rejected, if any, in the tailings. Especially in the treatment of husky, fine middlings on stones is a large amount of the embryous membrane, containing the injurious cerealine, mixed with the flour. In high grinding a large amount of the germ is rejected by the treatment with smooth rollers; very little of the bran is rubbed so small as to pass the silk meshes, and in the treatment of the husky middlings by purifiers and smooth rollers most particles of embryous membrane are rejected.

Mr. Benoit gives the following percentages as obtained by the American milling system (stone milling)—: Flours, 75 per cent; bran, pollards, etc., 23 per cent; loss, 2 per cent.

The flours consisted of—

First run stone flour	64	per cent.	
Flour from middlings	3	"	First quality.
Flour from tailings & reground middlings	6	"	Second quality.
Bran flour	2	"	Third & fourth quality.
Coarse bran	6	"	Weight 16½lbs per bush.
Small bran	7	"	" 19 "
Pollard	6	"	" 22-24 "
Tailings	4	"	" 35-38 "

By comparing this table with that of the high grinding products as given by O. Dempwolf, it may at first sight appear as if far more bran is separated by the American system, but if we refer to the weights of bran, pollard, and tailings we can form an estimate about their quality. A better comparison is shown in the following table of a trial grinding made in the Victoria Mill in Pesth, where the same wheat was ground on stones and also on rollers, both working on the high grinding system:

	Stones. Per cent.		Rollers. Per cent.	
Flour No. 0	6.5		8	
" 1	7.0		8	
" 2	5.0	35 per cent	6	48 per cent
" 3	5.5		6	
" 4	5.0		7	
" 5	6.0		8	
" 6	15.0		5	
" 7		40 per cent.		32 per cent.
" 8	25.0		27	
" 9				
Fine bran	21.0			
Coarse bran		25 per cent.		25 per cent.
Feed for fowl	0.5			
Loss	3.5			

This last table gives us at the same time an idea of the superiority of the rollers over stones, even if the latter grind high. By rollers as much as 43 per cent. of high grade flour is obtained, against 35 per cent. by stones. The percentage of bran in both these grists was equal, but if we refer to our tables we find that stone bran has 47.98 per cent. of starch, 14.77 per cent. of water, 6.00 per cent. of mineral ash, and 16.29 per cent. of albuminoids. Roller bran, on the other hand, shows 43.6 per cent of starch, 10.7 per cent. of water, 5.46 per cent. of mineral ash, and 14.3 per cent of gluten. These percentages show the roller bran to have been better cleaned than the stone bran, it having only 43.6 per cent. of starch, against 47.98 per cent. of starch in the stone bran. The roller bran also shows a far smaller percentage of water, which is another indication of the more perfect separation of starch by means of rollers. In fact some stone millers are said to have sent some of their finished bran to some of the roller exhibitors in the last milling exhibition; they were not a little astonished at the quantity of starch which was so stripped off the bran and not a few of them now finish their stone bran by rollers. But as we have seen even fine fluted rollers still leave 43.6 per cent. of starch in the bran, this shows us where millers and milling engineers can effect a further perfection in milling.

Every improvement in milling machinery which effects a further reduction of the percentage of starch in bran will prove to be of great value to its inventor, and to the millers. Such improvements must effect the stripping of the bran in such a manner as to avoid any excessive heat to be produced during its progress, because, although starch is insoluble in water under ordinary temperature, as soon as it is subjected to a high temperature it will burst its cells and become soluble. This soluble starch will then at once be transformed into dextrine in contact with the moisture and the albumoids which are contained in the wheat. This is also the reason why bran if cleaned by rollers, will produce a far better flour than if cleaned by stones.

We incline to the belief that the more *cutting* and *scraping* the action of the reduction machines is, the better will the perfect separation of the bran be effected and the *less heat* will be evolved. The rubbing and tearing action of the stones must of necessity cause a large amount of heat to be produced in the material reduced by them, and the consequence of this is, that the heat in combination with the natural moisture of the wheat, causes some amount of starch to become soluble. This is clearly shown by the great amount of sticky half-decomposed paste, which settles in the stone spouts, on the worm-blades in the elevators, and on the ribs of the dressing machines. It is a fact, also, that low grinding rollers show this paste.

Millers ought to bear in mind that whatever milling system they employ, they ought to avoid the production of soluble starch, and that they can do so only by the adoption of the gradual reduction system. The value of flour is in direct proportion to its contents of soluble starch, and the value of a milling system can best be tested by the heat it evolves during its different stages. The formation of soluble starch during the manufacture of flour can be, to some degree, diminished by the use of wheat-heaters, and by flour-drying appliances, and we need only mention the extensive use of machines in the United States to show their advantage. Everywhere where durable flour is required, the employment of such drying appliances will certainly pay.

Notwithstanding all this, we do not condemn the stones as reduction machines, but only the way in which they are used. We believe that stones or rather horizontal discs, are capable of improvement, because we think it ought to be possible to make them work in such a manner as to avoid as much as possible rubbing and tearing, and simply allow them to act as cutters or scrapers? If milling engineers would bestow a little more of their ingenuity on this problem, they might, perhaps, find that *our old friend* is capable of doing good work still. It must never be forgotten that the action of two horizontal discs seems to possess special advantages for a *slow* reduction. The material has to make a longer way during its passage between the discs, and it ought, therefore, to be possible to effect its reduction in a very gradual way, step by step. During its passage through the rollers the material is subjected to a sudden pressure and friction, which must undoubtedly cause momentarily a high temperature. We are well aware of the fact that so far rollers have produced less heat than horizontal discs, but if we bear in mind that the same work of reduction could be so distributed over a longer way on the latter than on cylinders, it seems possible that the amount of heat evolved during such reduction, ought to be less on the longer way than on the short one. In fact, it might be said, that if horizontal discs could be so improved they would be the very best means for gradual reduction. There are many milling engineers who recognize this advantage of horizontal discs, and some have already tried to improve them, but millers ought to thoroughly test their efficiency before adopting them, and rather stick to their ordinary millstones, than employ anything which is only fitted with all sorts of mechanical complications, without doing anything better than their simple and durable stones. On the Continent porcelain mill-stones have lately been introduced by a firm in Berlin, and from all we can hear they have given very satisfactory results. The furrows when once shaped will keep sharp for more than two months and they are said to evolve hardly any heat. In any case it appears that such stones can be made of very even hardness over the entire surface, and they therefore also keep very true.

We will now consider the various machines which are employed for the conversion of the wheat berry into flour and its bye-products, with regard to their efficiency in the perfect separation of husk and germ.

We know that it is first necessary to remove all admixtures and the exterior impurities from the wheat berry before reducing it, and it will suffice here to say that millers will do well, not only to consider improvements in gradual reduction, but first and foremost improved modes for cleaning the wheat thoroughly.

Even by gradual reduction they cannot obviate the injurious effect of extraneous impurities, and if they can remove the germ and the seam impurities *before* they produce any flour, they ought to spare no trouble to do so.

In the different stages of gradual reduc-

tion the wheat berry is cut into pieces, so that the endosperm, (or the starch body) is exposed to the action of the reduction machines, then the starch is scraped off the husk, and next the endosperm is reduced to powder. At the same time we have to separate after each successive reduction as much of the husky particles as possible.

Until horizontal discs can be so improved as to work in a cutting and scraping manner, we shall find that fluted rollers present the best means to granulate the wheat berry; but it seems to us as as if the starch which is still attached to the bran during the last breaks, could best be stripped off by some improved form of horizontal discs. For pure, or nearly pure middlings also, a reduction by means of horizontal discs seems to be the one specially suited, if the two discs could be made perfectly rigid and equi-distant. Such discs would reduce the middlings by rolling them and thus slowly reduce them to powder. In smooth rollers the pure middlings always cake more or less, and although often so-called detacheurs are employed to give them a slight rub, the flour particles obtained in this way preserve their flattened form, and as they pack close, and are to a certain extent compressed, their baking quality is slightly lowered.

Those middlings which have a larger amount of husk still attached to them, ought to be reduced by smooth or very fine fluted rollers, according to their size. The very fine fluted rollers seem to be the best means for either cutting or scraping the large husky middlings, and thus to effect a separation of starch from husk, whereas the smaller husky middlings can probably only be effectually treated by means of smooth chilled iron or porcelain rollers, with good differential speed. It seems impossible to treat these small and thin particles on horizontal discs, so as to scrape the starch off them, without at the same time to reduce the husk and cause excessive heat.

A further most important means to effect a more perfect rejection of the husk, are the purifiers. The purifiers enable the miller to reject the light husk, which has been separated from the husky middlings, by stripping the endosperm off them during their passage through the smooth rollers. Of course this stripping off of the starch is not generally effected in one passage through the rollers, but by two or more passages. The middlings ought to be purified; that is, classified or separated according to their specific gravity and size, after each passage through the rollers.

If we remember the great injurious influence of the embryous membrane on diluted starch, or rather that of the cerealine contained therein, we shall at once see the great importance which the purifiers possess in the perfection of the manufacture of flour, and in the entire removal of some of those components of the wheat berry which cause a conversion of starch into dextrine.

It is especially the embryous membrane, the light yellow husk or pollard, which is so strongly attached to the endosperm, and the separation of which is effected by the smooth rollers and the purifiers.

Quite another separation is effected by the dressing machines. Whereas purifiers chiefly separate, according to specific gravity, dressing machines only separate according to size. Of course the material treated on purifiers is generally also sized; but this is only done to adjust the force of the suction blast to the size of the middlings. If the middlings were not sized, the blast would have the tendency to throw large, heavy middlings among the small, light one; or small, pure middlings would be thrown among the husky, heavy ones. It is, therefore, an important point also in gradual reduction, to employ effective means for properly sizing the middlings. If possible, each size of middlings should have a separate fan and a separate exhaust pipe.

Great care should also be taken, if it be necessary, to join any exhaust pipes before they enter the stive room. The section of the main trunk must not only be equal to the total area of all its branches, but also the branches must not form an angle with the main trunk where they enter. If this point were always properly attended to, much trouble in the proper working of the purifiers might be spared, and a great amount of exhaust spouting from purifiers to the stive room might also be saved.

To return to the dressing machines, although they mainly effect a separation according to size, they also cause a slight separation according to gravity, which may be turned to advantage in the production of the finest grades. As the meal enters into the dressing machines it is agitated, and thereby the heavier particles move next to the silk, whereas the lighter ones will float at the top. Dressing machines are generally divided into a number of compartments (mostly four in centrifugals), and the heavier particles will therefore pass the meshes already in the first compartments, whereas the lighter particles will only pass through the meshes of the following compartments.

This floating of the lighter particles at the top does not, however, take place as soon as the meal enters the dressing cylinder, but only gradually, and we, therefore, believe it to be better, if, contrary to general custom, the first sheet of silk be coarser than the succeeding ones. On the first sheet of silk the layer of meal is thicker and more mixed than on the following ones; but the finer particles have greater facility to slip next to, and through the silk, than the larger particles. Thus, if the first sheet of silk be coarser than the next, the flour dressed through the first will be equally as fine as that from the second and third sheet, although the latter may be finer. We are aware that many millers hold contrary opinions; but it seems to us very plausible, that there is less tendency in the lighter and impure particles to pass through the first sheet, than though the following ones, and that, therefore, the flour silks ought to become finer as the meal proceeds. Of course certain limits must be observed with regard to the finest and coarsest meshes.

There are two different classes of dressing machines chiefly in use, the ordinary silk reels and centrifugals. Vertical centrifugals have often been attempted, but we are not aware that any of them have been successful or are extensively in use. In the silk reels the dressing material enters a slowly revolving polygonal prism, where, by the longitudinal bars, it is continually turned over, so that it may be said that every particle of the meal is successively brought in contact with the dressing surface; consequently the small particles will fall through the meshes and the large ones will be passed over the silk and be delivered at the tail end. The forward movement of the meal over the silk is caused by a slight inclination of the dressing cylinder. In all reels where the silk lies next to the wooden longitudinal ribs, as in most cases, a floating of the light particles on top of the heavy ones cannot take place because the meal is continually turned over. We know, however, a reel, in which the silk is fastened round steel ribs covered with linen, which are fastened at a distance of about 2 in. from the wooden ribs. In this reel the meal continually slides backwards as the cylinder revolves; the meal is not turned backwards because it can pass between the silk and the wood ribs. A distinct floating must in this case take place, especially as the above mentioned steel ribs are supported by elastic springs, thus avoiding all shocks. The floating of the light particles is a great advantage in all dressing machines, because light husky particles which are small enough to pass the meshes of the silk, cannot go into the flour if they are floated, and thus do not come in contact with the silk. But even in the best reels the dressing action is not very intense; the reel must, therefore, travel very slowly over a large dressing surface. They therefore take up much valuable space, and although they are simple and durable machines, they do not effect a good separation of husk and starch particles, as there is no tendency to detach those starch particles which may still be very lightly attached to the husk.

In centrifugals the meal also enters a slowly revolving cylinder, clothed with silk or wire, but within this cylinder a number of blades revolve at high speed, so that the meal is continually thrown against the dressing surface and all round the cylinder. The centrifugal force of the impact of the beaters will throw the heavier particles with greater force against the silk than the light ones; the starch particles will therefore keep next to the silk, and prevent the husk particles from coming into contact with the dressing surface, that is, if no longitudinal bars are used in the dressing cylinder. But when longitudinal ribs are present, the meal will always get into a moving state in each corner formed by the rib and the silk, the floating action will be disturbed, and the beaters will have to overcome an increased resistance where the meal accumulates in the corners. The working of such centrifugals is very intermittent, as can be observed from the trembling motion of such dressing cylinders. On the other hand the dressing action of the centrifugals is very intense and a great amount of starch, which is still lightly attached to the husk, will be severed by the action of the beaters, so that the separation of husk and starch will be to some extent enhanced. Much less dressing surface is required, and if no longitudinal bars be present the floating of the light particles would be perfect.

Centrifugals not only effect a better separation of the husk from the starch, but they also dress a greater quantity of flour through a much smaller surface of silk with finer meshes than those in use on ordinary reels.

Wherever millers want to make a clean, strong flour, without specks, they must employ centrifugals without longitudinal bars, because, *if the feed is sufficient*, the husk will never come in contact with the silk.

If we bear in mind that the white particles are the heavy ones, and that they must therefore cover the inner surface of the silk, till they are enabled to pass, and that there is always a certain amount of white particles contained in the meal, which cannot pass through the fine meshes of the flour silk (No. 13 to 16—they pass through No. 7), it will be clear that these last mentioned coarse, white particles, will prevent the light husk from coming into contact with the silk.

Of course this floating is much disturbed, not only by the occurrence of longitudinal bars, but also by the mostly polygonal shape of dressing cylinders. Round cylinders without longitudinal bars will admit the floating without disturbance, and as the beaters find no obstruction, they will throw the meal all round, thereby decreasing the resistance of the meal against the beaters, and materially increasing the available dressing surface. Great attention should also be taken to give the beaters a backward inclination, so as to lessen not only the blast which is unavoidably caused in centrifugals, but also the resistance of the meal against the revolving of the beaters. The entrance and delivery openings ought also to be closed up as far as practicable, in order to reduce blast.

Having thus compared the two different constructions of dressing machines with regard to their efficiency in separating husk, we will now consider the purifiers in the same light. Purifiers may be divided in three classes. In one the middlings are first sized in a riddle with flat horizontal sieves, and they then fall separately through a system of small hoppers, passing through a suction blast, by means of which the lighter particles will be thrown over into separate compartments. In the other class the middlings pass over a horizontal riddle enclosed in the machine, and the suction blast is drawn through the silk meshes of the riddle, thereby floating the light particles on the top, and allowing the heavy middlings to pass through the silk according to their size. There are also some centrifugal purifiers where the middlings or seminola are fed on a horizontal disc, and by the centrifugal force thrown further from the centre than the light ones. A suction blast is passed through them, and thus the very light particles are drawn into separate ring-shaped compartments. This kind of centrifugal purifier is generally built in a multiple form, that is, a number of discs are used above each other, so that the middlings pass the suction blast several times, and are sorted into several grades of different weight and purity.

If we compare these different classes of purifiers, we shall find that the separation of husk is more effectively accomplished in the first class, than in the second. The centrifugal purifiers, are very efficient in their separation, but they are of very limited capacity, and they are so very sensitive, that the product varies as soon as any irregularity occurs. They will turn out quite a different product with a loose belt than with a tight belt. They are however, at present, the best means for treating soft semolina, a material in the treatment of which the utmost sensitiveness and a frequent repetition of the purifying process is required. In the purifiers with enclosed riddles, with a suction blast passing through the same, the middlings pass over the silk in forming a layer of a certain thickness, and the thickness of the layer causes an impediment in the separation of the light husk. In these purifiers a good feed is nevertheless an advantage, because it avoids the contact of the light particles with the silk. Of course a stronger suction blast would be required for a thick layer, than for a thin layer of middlings, and this forms one of the week points of these machines. The feed can never be so regulated that an equal resistance will have to be overcome in every part of the riddle, there will always be spaces on the silk, where the suction blast finds the least resistance, where consequently the blast will be stronger than on other places. Such spaces of smaller resistance are not fixed to a certain place of the riddle, they vary continually, and they therefore cause great irregularities in the floating of the light particles. There will always occur in such purifiers moments when a certain place in the riddle is subjected to a very light suction, and where light husky middlings can fall through the meshes into the pure middlings. If millers will look through the window of such a purifier on to the riddle, they will easily observe the irregularity of the suction as indicated by the small clouds of very light bran which are continually changing their place and form irregular lines. If the suction were regular, the light particles would not form clouds, but would form an even trembling surface. No blast adjusting and cloth cleaning appliances will ever overcome this irregularity, as it is chiefly caused by the irregular size and the consequent accumulation of the heavier middlings in certain parts of the riddle. In the first class of purifiers with outside riddle, where the middlings fall through a system of small hoppers and pass several streams of the suction blast, every particle is individually subjected to the same diverting force of the moving air; there are no places of smaller resistance, at least none need be. The separation of the particles according to their specific gravity is, therefore, more efficient, and only a very gentle blast is required. Generally this class of purifiers is more compact and more simple than those with enclosed riddles. As they require less blast they also require less power to drive them, and, when compared with regard to price and capacity, they are generally cheaper.

Those machines which we have so far investigated with regard to their efficiency in separating husk and germ from the starch body of the wheat—namely, stones, fluted rollers, smooth rollers, dressing reels, centrifugals, and the different purifiers—form the main part of the machinery in most mills, and we have now only to examine some special machines, such as disintegrators, disc mills, and detachers.

Disintegrators consist of two studded discs, which revolve at a very high speed in different directions. The studs of these machines are either round pins or oblong studs, covered with small corrugations. This last kind we think is a very good means for cleaning bran if they are run at a moderate speed. They may also turn out good results in low grinding systems, but seem to be more suitable for soft wheats. They must unavoidably cause a greater reduction of the bran to powder small enough to pass the silk meshes than is effected in rollers, and their high speed must increase the amount of motive power necessary for a certain capacity.

Disc mills have till now been employed mostly in the granulation of the wheat. In these machines one disc is stationary and the other is driven at a moderate speed. They have the advantage of adaptability to small capacity, but they perhaps nevertheless exert a more rubbing and tearing action on the wheat than rollers. They must, therefore, make a greater percentage of break flour, and less middlings, than break rolls. Also the friction of the bran on the stationary disc in the last breaks, when the disc have to work very close, becomes great, and much motive power will be required to overcome this friction. Whatever the shape of the flutes of disc mills may be, they may work very well in the first breaks, but for the last breaks, disintegrators at slow speed would probably work better and require less power.

Although disc mills of small capacity can very easily be made without imparing their results, the centrifugals, dressing the meal produced by them, cannot be economically reduced below a certain size of cylinder and a certain length, so that the smallest capacity of a disc mill plant must chiefly depend on the smallest size of centrifugals.

Detachers do not effect a separation of husk and starch properly speaking, but they may be regarded as important auxiliary machines for repairing soft semolina coming from the smooth rollers before entering the centrifugals. But these detachers ought never to consist of even discs with any kind of furrows or flutes. They ought to be more like disintegrators, to give the meal passing through them more liberty. Those millers that have had some experience with the smooth detachers will know that their use is often, if not always, imaginary. If they are set close enough to detach they are very liable to cause their belt to slip, and thus to produce stoppages. Smooth detachers are generally set so wide apart that they have hardly any influence on the meal passing through them. If they were made disintegrator like, as here suggested, if they would fulfil their purpose and not be liable to stoppage.

[*Continued on page* 74.]

A NEW DEPARTURE!

We are the Sole and Exclusive Licensees for this country under the

MORRITZ MARTIN PATENTS

ON

CENTRIFUGAL FLOUR DRESSING REELS

AND WE ARE NOW PREPARED TO FILL ORDERS.

THE CENTRIFUGAL has more than FOUR TIMES the capacity of the ordinary reel, and will make clear flour and a clean finish on stock that cannot be treated in the common reel without loss, no matter how much silk it is passed over.

IT IS SPECIALLY ADAPTED to handling soft, re-ground material, full of light impurities, whether from rolls or stone.

IT IS INDISPENSABLE to a CLOSE FINISH in any system of gradual reduction milling, and will improve the quality of the low grade flour at the same time it makes the offals cleaner.

IT MAKES A CLEAN SEPARATION on caked and flaky meal from smooth rolls, which no other style of reel can do.

IT IS VASTLY SUPERIOR to the common reel for dusting middlings.

THEY CAN BE USED TO ADVANTAGE as a complete system of bolting, to the exclusion of the ordinary reel.

THE MARTIN PATENTS!

Are THE EARLIEST granted in this country on Centrifugal Machines, and intending purchasers will do well to examine the claims allowed him before placing their orders.

Write for descriptive circular and price list to

GEO. T. SMITH

MIDDLINGS PURIFIER CO.,

JACKSON, MICHIGAN.

[Mention this paper when you write.]

[*Continued from page 72.*]

There are of course a multitude of milling machines which we cannot here specially examine, but they will all bear a certain relation to those here mentioned, and their influence on the separation of husk and germ will be corresponding. Our purpose was chiefly to show the importance of a perfect removal of husk and germ, as shown by chemical analysis of the products of milling, and the means by which such removal is effected, and where it might be improved.

We believe that the future will bring still more different machines for the manufacture of flour than those already in use. The tendency of this present time goes towards employing special improved means for special purposes. In milling this means that the successful systems need not be those which work by stones alone, or by rollers alone, or by discs exclusively, but those systems which everywhere adapt their tools specially to the different materials.

The milling system of the future will be gradual reduction, but the nature of the tools employed will be decided by their suitability for their special purpose.—THE FITTEST WILL SURVIVE.

"GERM."

Recent Milling Patents.

JANUARY 24, 1882.

Corn sheller, Henry A. Adams, Sandwich, Illinois.

Bag-holder, Perry Allen, Flint, Mich.

Roller-mill, Charles Gates, Brooklyn, O.

Grain grinding and reduction machine, John Stevens, Neenah, Wis.

JANUARY 31, 1882.

Roller-mill, Noah W. Hott, Buffalo, N. Y.

Corn sheller, Leonard Kissner, Lancaster, Ohio.

Grain drying apparatus, Henry Scholfield, New York, N. Y.

Roller-mill, C. Seck, Dresden, Saxony, Germany.

FEBRUARY 7, 1882,

Grain pulverizer, Lewis S. Chochester, Jersey City, N. J.

Waterwheel, R. N. Davidson, Weaverville, California.

Grain cleaner, separator and cleaner, Jas. M. Hawley, Odin, Ill.

Grinding-mill, John T. Obenchain, Logansport, Ind.

Roller-mill, J. Fiechter & Sons, Minneapolis, Minn.

Flour-dressing machine, J. Fiechter & Sons, Minneapolis, Minn.

FEBRUARY 14, 1882.

Anti-friction roller bearing, Heinrich Buessing, Brunswick, Germany.

Millstone-driver, Amos Callahan, Maryville, Tenn.

Millstone dressing machine, W. W. Cleveland, Marshall, Mich.

Roller grinding mill, Cyrus T. Hanna, Allegheny, Pa.

Grain separator, Charles E. McNeal, Silver Creek, N. Y.

Grain separator, Lyman Morgan, Port Washington, Wis.

Corn sheller, J. W. Rickey, Chelsea, Mass.

Grinding-mill, C. D. Ross, Rutland, Vt.

Funnygrafs.

"Papa, me has been baptized, ain't me?" asked a three-year-old son.

"Yes, my boy."

"Then we won't have to be baptized again?"

"No; but can you remember anything about being baptized?"

"I dess I can. The minister shoved up my sleeve and stuck a knife in my arm!"

"When I am gone, dear Joseph, will you come and press the earth down on my lonely grave, when the wind sobs mournfully through the trees and the rain patters down on the dead flowers and the night its holy vigil keeps? Say will you, darling?" "Naw! do'u think I'm going out in the rain and wind at midnight and wander in ghostly grave yards to stamp the mud down on your coffin? You must be sick if you do!" "You're a nasty, mean thing, Joe Saunders," screamed the poor girl, "and if you ever speak to me again I'll slap Hades out of your freckled face;" and Arabella flounced in and slammed the front door.

The fork in the roads—Gracefully dropping on one knee, he busied himself fastening a skate to the pedal phenomenon which she exhibited to his astonished gaze. All at once he stopped in the very middle of his task and appeared to be reflecting profoundly. "George, darling," she asked, "what are you thinking about?" "I'm thinking," he answered abstractedly, with a look that indicated how deeply he was affected by the idea that passed his mind, "I'm thinking, dear, whether, if Noah had had one one of your shoes, he would have found it necessary to build the ark." From that moment their souls floated toward the infinite future by different routes.—*Brooklyn Eagle.*

THE BAD EFFECTS OF STRADDLING.—Two blooming ladies, fair to look upon and elegantly dressed, rode down on the street car together yesterday morning, to attend to their duties on the Woman's Grain Exchange. One was a blonde, the other a pronounced brunette, and both had the external graces of lovely womanhood. They were much interested in discussing the present unsettled condition of the market, especially the decline of wheat. So deeply engaged were they in the consideration of this weighty matter, they did not stop to think how extraordinary their conversation sounded in the ears of the uninitiated listeners. Said the blonde, "Oh, this drop is to be accounted for in many ways. The millers have shut off grinding, and because of the late fall, farmers will not need so much grain for feed. Besides, there is a good deal of monkey business among speculators, and they are banging away at each other without regard to the propriety of things or the actual condition of the supply and demand."

"I tumbled into a pretty good thing on that last bust," said the brunette. "I don't care if the whole bottom falls out."

"I do," retorted the other; "I'm an awful big bull; I believe in crowding. I'm long now, and stood in for $1.30."

"Maybe I'd better straddle," suggested the other.

"No. Don't you straddle anything. That'll break up the best of 'em. You might as well try to ride a buzz saw."

This was too much for one of the passengers, a board of trade man, who smiled so ardently that the ladies were confusedly interrupted, and signaled to the conductor to stop the car. There was a twitter as the two got out.—*N. Y. Journal of Commerce.*

New Wheat-bearing District in India.

The India office is lending its sanction just now to an enormous scheme for the reclamation of the waste lands in the Punjab. The waters of the five rivers which give a name to that region flow wastefully away to the sea, leaving a large tract of desert land, some of which was once fertile, to be the home of nothing and nobody. Those same rivers are sufficient to make that same desert blossom as a rose. The work of cutting canals, which would afford means both for navigation and irrigation, would be enormous; but so far is it thought feasible, that the India office has undertaken to use the canals, paying tolls for its transits, and to buy the irrigating water, undertaking on its own account to collect the water rent from the natives. Engineering experts declare that the special work can easily be done, and reports have been made to the India office which show that the land to be reclaimed has soil so rich in alluvial deposit from the Himialayas that we may reasonably anticipate the time when a great region, now suffering only from want of water, will become the great wheat-bearing territory of India. Some portions of the great doab which it is proposed to reclaim—a doab 50,000 square miles in extent—have undoubtedly been both inhabited and highly fertile in their day. In some cases the canal is almost made, the unused bed of diverted rivers lying ready to be again filled with the life-giving stream. So that the earlier portion of the great work will be comparatively easy. But, whether easy or hard, the reclamation of 50,000 square miles of land in an over-populated country, the irrigation of a tract so enormous in a country visited so frequently by famine, is a task the magnificence of which, from an engineering and from a political point of view, almost overweights the imagination.—*Produce Exchange Bulletin.*

A Barrel Full of Boys.

On the property of Howes, Babcock & Ewell, at Silver Creek, N. Y., stands an old house no longer in use and falling to decay. The building has gradually settled into the soft soil, and the land around it has been raised until the roof of the building is nearly level with the ground. Recently Mr. Carlos Ewell, of the above-named firm, was looking over the premises, and noticed a barrel standing near the ice-house. Looking into the barrel, he was astonished to hear a confused murmur, like human voices, coming therefrom. He at once summoned the owners of the voices to come forth, and in a short time a boy with a blackened face rose up out of the barrel. Before the horrified gentleman could ask for an explanation another good-sized boy squeezed his way out of the barrel. Then another and still another came to the surface, until about thirty boys, most of them with blackened faces, capered around the barrel, making mysterious remarks about "the cave," "the captain," and sundry other things supposed to belong to bandits, brigands, and that class of heroes. It was easy enough to understand how one boy could hide himself in a barrel, but how thirty could find room, was a puzzle only solved by the leader of the dusky band, who explained that the boys had made a tunnel from the surface down into the old ice-house, and placed the barrel at the mouth to conceal their work. Two or three of the older boys pressed the younger ones into the service, and the compact tanbark in the interior had been excavated and divided up into rooms, as the "captain" explained, "for the officers and the common workmen." The work was begun before Christmas, and was just about finished when discovered.

IN a report on riveting in locomotive boiler work, made by a committee of the American Master Car Builders' Association, is found the following: The operation of "driving" rivets consists in placing a set on the end of the rivet, and sledging it down to form the head, the operation requiring two men to sledge—one to hold the set, one to manage the holder—and a boy to heat the rivets. "The rivet is not struck direct by the sledges at any time during the operation of driving, but the head is formed entirely by driving the set down squarely on the end of it. To drive a rivet requires about twenty-four blows with the nine pound or ten-pound sledges, at the rate of about eighty blows per minute; a flatter, with a face about one and one-half inches square, is then placed on the lap alongside the rivet, and given five or six blows to close the sheets together; the set is then placed on the rivet head again, and given five or six more blows, and the rivet is finished, the whole operation of driving requiring about thirty-five seconds of time to the rivet. In practice we find that a riveting gang will drive in the seams of the shell of a boiler an average of thirty rivets per hour, or three hundred per day, and in the seams of the firebox, in throat and back sheets, dome, mud ring, braces, etc., an average of about twenty-two rivets per hour. This includes the time necessary for taking out bolts, drifting holes, adjusting the tools and work. In hand riveting two riveters will drive, on an average, taking the whole boiler, only about one hundred and twenty-five rivets per day, or twelve and one half per hour,"

The devolopements of the financial result of the new German tariff, as shown by the receipts, appears on the whole, says a German contemporary, to have disappointed the expectations that were raised regarding it. And no better proof of this could be adduced than the fact that in the estimates of the budget for 1882–83 the receipts for duties have been set down as 1,783,000 marks lower than in the preceding year. It would be interesting to know what reasons have induced the German government to make this estimate, but they have not seen fit to inform the Reichstag, and one is left entirely in the dark as to this. In the absence of these reasons the journal referred to, in order to judge, falls back upon the statistics of imports during the last four quarters for what statistics exist—*i. e.*, October 1, 1880, till the end of September, 1881. It is found that the necessaries of life have contributed to the present surplus far more than was estimated two and a half years ago; so, for instance, the duties on grain yielded 17,250,000 marks, instead of 12,000,000; petroleum, 26,500,000, instead 16,500,000; lard, 4,250,000, instead of 3,750,000; bacon, 2,500,000 instead of 750,000; flour, 1,666,000, instead of 333,000; rice, 3,333,000, instead of 2,250,000 marks. The indespensable necessity of importing these articles is incontestably proved by these glaring figures, and it cannot be denied that the heavy burden of taxes which by these new duties is laid upon the very necessaries of life used by the great mass of the popolation, in truth, greater than was anticipated in 1879.

BURNED.—The flour mills of Thornton & Chester, Arnold & Little and Oliver Gibson, Lockport, N. Y., were destroyed by fire January 31. Assistant chief Engineer George Woods, was cut off by fire, and compelled, as a last hope, to jump from a sixth story and was killed instantly. Several firemen were badly hurt. Loss, $100,000.

Stock Brokers' Methods and Profits.

The membership of the New York Stock Exchange is limited to one thousand seats. A member can sell his seat, but the sale is contingent on the approval of the purchaser by the Committee on Admissions. If the committee reject his application, which is not a rare event, the member desiring to sell must find another purchaser. The price of seats varies with the state of business. At this time it ranges between $27,000 and $30,000. During the years of depression following the panic of 1873 the price fell as low as $5,000. Two years ago a member considered himself fortunate in being able to sell out for $17,000. Three years of enormous crops, each larger than its predecessor—such as we had in the years 1878–79–80—caused the price of seats on the Stock Exchange to rise to their present figures, which we believe are the highest in the history of that institution. Abundant crops make fat the New York broker; therefore, it may be understood how important the "crop question" is in Wall street. The Exchange is not an incorporated body. It is a voluntary association of individuals, unknown to the law, having neither charter nor franchise; owing as a body allegiance neither to the state nor the United States; having its own courts and a code of law which, like other law codes, has been the slow growth of experience. All disputes arising out of transactions on the Exchange must be settled by appeal to the tribunals which the Exchange provides. Expulsion is the penalty for an appeal to the law courts of the state by one member against another in a stock transaction. The Exchange has its own code of penalties, the highest being expulsion. It is found sufficient to enforce entire obedience.

The Exchange prescribes all the rules which govern a member in dealing with his customers. They are very stringent, and most rigidly enforced. First, he is required to charge a commission of ⅛ of 1 per cent. on every sale and purchase. He can make no deduction for any one. He must not "split commissions," as it is called, under pain of losing his seat. This rule is enforced with relentness severity, as a protection against unfair dealing. Splitting is done sometimes, but discovery is invariably followed by the infliction of the penalty. By compelling every broker to charge the same, the poorer members are protected against the richer, who, on account of the large business they do, could do it at less rates, and thus in time the whole business of the Exchange would be monopolized by a few large houses. No such thing can happen while every broker makes the same charge.

The ⅛ of 1 per cent. is on the par value of the shares or bonds in which the transaction takes place. Thus, it costs no more in commissions, nor no less, to buy or sell 100 shares of New York Central at 130 than to buy or sell 100 shares of Ohio Central at 24. The commission is equally $12.50 for either. This is the broker's first profit. He is sure of that, however the transaction goes. The customer is as sure to have to pay it. The effect is, on all speculative dealings, to make the customer bet $125 against $75. For example: A buys 100 shares of Union Pacific at 117 and sells at 118. He pays $12.50 for buying and $12.50 more for selling, and his profit is therefore $75. But suppose, after buying at 117, he has to sell at 116, then he loses the 1 per cent. on the stock and the $25 commission beside—$125.

The usual deposit of margin on a speculative purchase or sale is 10 per cent. Brokers may be found who will take less, but they are, as a rule, not the best people to deal with. Purchases on margin of less than 100 shares are not customary. It is only under special circumstances that a reputable broker will take an order for less. While 10 per cent. is the customary deposit, more may be called for according to circumstances, as in times of panic or great excitement; or when the price of a stock has been manipulated up to top-heavy figures; or on a very heavy purchase, say, 50,000 shares of one kind of stock. If the market turned against the purchaser, such an amount of stock could not probably be thrown upon it without breaking down the price considerably more than 10 per cent. In such a case the broker would require, say, 30 per cent. margin.

The Stock Exchange requires the broker to charge his customer 6 per cent. on the money he lends him to buy the stock. This rule is as rigid as that about the commissions, because the same effect as charging a reduced commission could be brought about by means of reduced interest charges. Here comes in the broker's second profit, namely, his gains by interest. The broker must charge his customer 6 per cent., but he generally borrows the money he lends that customer at much less than 6 per cent. Every day in the year, therefore, that money on call loans is less than 6 per cent. (and most of the year it is) the broker is gaining the difference between 6 per cent. and the actual market rate on all money he has borrowed and lent to his customers at the time. It is considered to be a rule with the large houses to make the interest profits pay the annual working expenses.

Of course, the broker does not actually put the money he lends his customer into his customer's possession; but the effect of "carrying" the stock for him is actually the lending to him of the difference between the 10 per cent. margin deposit and the price at which the broker buys the stock in the market. The broker buys the stock and keeps it until it is sold. Then he renders his account, with interest charges and commissions, and the profit or loss, as the case may be.

A customer has the right to order his broker to keep in the office any stock bought for his account; but this is rarely done, and only under special circumstances. The usual course is for the broker to lend it, if he can. The borrowing broker pays for it the regular market price. The lender may call for the stock at any time on tendering the market price; the borrower may demand his money at any time on tendering the stock. So long as the borrower holds the stock, he must, under the rule, send daily to the broker of whom he has borrowed it, a check for the increased price if the stock has risen; on the other hand, the lending broker must send daily to the borrower a check for the amount the price of the stock may have fallen. Keeping the balance good in this way is the duty of the clerks and bookkeepers in the various offices. Prices are made up for the day at 2.15 P. M. In actual practice, however, this rule of keeping the balances good daily on all stocks is scarcely ever observed between well-established houses. Only when the market has gone several per cent. away from the range of prices at which the transaction was made is a call made by either party on the other.

The profit that a broker may make by lending stock lies in interest charges again. Suppose that a stock is in great borrowing demand by reason of having been extensively "sold short;" then those who borrow it are willing to pay something for the accommodation of getting it. The lender of the stock receives from the borrower a check for its market price, and so long as this money pledge remains in his hands he pays interest on it to the borrower of the stock; but on such occasions the borrower may say, in effect: "Lend me 1,000 shares of Western Union, and you need pay me no more than 2 per cent. interest for the money I pay you for it, the open interest rate now being 5 per cent." If the demand for the stock be very urgent, it may lend "flat"—that is all charges being at the expense of the borrower—and on rare occasions a commission in addition may be paid. These are the profits of the broker who has stock to lend. On such a transaction he would be charging his customer 6 per cent. on the money he lent him to buy the 1,000 shares of Western Union, while he was paying only 2 per cent. for the money he borrowed himself, or might be paying nothing at all and getting a small commission besides.

In another way the broker may make his 6 per cent. interest charge clear profit. Suppose he has two customers, one of whom (A) is "long" 1,000 shares of Western Union, the other (B) "short" the same amount. The broker has bought the 1,000 shares for A, and charges him 6 per cent. on the cost price so long as it is carried; he has sold the 1000 shares for B, and gets the money back; but, instead of borrowing the stock for delivery, he uses A's stock for that purpose. Thus the two transactions balance each other, and the 6 per cent. interest charged to A is clear profit.

It must be remembered that, in selling stock "short," the thing sold has to be delivered to the purchaser the same as in any other sale and purchase. The delivery must be made before 2.15 P. M. of the following day unless the terms of the sale provide for a different time. The one difference is that when the broker has sold the stock he borrows it of some other broker who has the stock to lend, giving his check for the market price, and makes his delivery with it. When the time comes that the broker "covers his shorts," he buys the stock in the open market and returns it to the one he has borrowed from, receiving his money back. The profit or loss is the difference between the price the stock was sold at and the price at which he "covered." Of course, a customer has no interest to pay his broker on a "short" sale (unless the stock could only have been borrowed at a commission), as the broker gets his interest paid by the lender of the stock, with whom he pledged the market price of it. There are no data for computing the aggregate amount annually paid by customers to the brokers of the Stock Exchange for interest; but the sum total paid yearly as commissions may be approximately estimated by the number of stocks and bonds bought and sold. The amount is simply enormous. Let us take the transactions of a single day only. A moderate day's business will be 300,000 shares, to say nothing of bonds. Knock off from this 50,000 shares as representing the trading of brokers operating on their own account—the "room traders" as they are called. We have 250,000 shares left as bought and sold on commission. The par value is $25,000,000. One-eighth of 1 per cent of this sum is $32,250. Over $32,000 paid to the 1,000 brokers of the Stock Exchange for commissions on one day's transactions in shares alone—and a very moderate day's business at that—will give some idea of the amount paid in the year.—*Bradstreets.*

Things Worth Knowing.

To reduce bushels of American maize to quarters (480 lbs.), multiply by 7 and divide by 60.

To reduce cwts. of flour to barrels (196 lbs.), multiply by 4 and divide by 7.

A sack of flour weighs 280 lbs.
A barrel of flour weighs 196 lbs.
A barrel of pork weighs 200 lbs.
A barrel of rice weighs 600 lbs.
A barrel of powder weighs 25 lbs.
A firkin of butter weighs 56 lbs.
A tub of butter weighs 84 lbs.
100 Russian chetwerts of wheat equal 72 qrs.
100 Russian chetwerts of seed equal 83 qrs.
100 Russian chetwerts of barley equal 88 qrs.
100 Russian chetwerts of rye equal 74 qrs.
100 Russian chetwerts of oats equal about 68 qrs.
100 Egyptian ardebs of wheat equal 62½ qrs.
100 Egyptian ardebs of beans equal 65 qrs.
1000 Egyptian ardebs of cotton seed equal 115 tons.
1015 French kilogrammes equal 1 ton.
816 Constantinople kilos equal 100 qrs.
100 Galatz kilos equal 143 qrs.
100 Ibrail kilos of wheat equal 232 qrs.
2¾ French hectolitres equal about 1 bushel.
A Dutch last of wheat equals 10½ qrs.
A Dutch last of barley equals 10½ qrs.
A Dutch last of oats equals 10½ qrs.
A German last of wheat equals 13 to 14 qrs.
A Smyrna kilo equals 1 bushel.
100 Malta salmas of wheat equal 94½ qrs.
5 Spanish fanegas of wheat equal about 1 qr.
5 Chilian fanegas of wheat equal 160 lbs.
350 Austrian stajas of wheat equal 100 qrs.
1 maund of Indian wheat and seed equal 80 lbs.
25 Portuguese alqueire of wheat equal 1¼ qrs.
Barcelona cras of wheat equals 1.925 bush.
10 Norway maas—1 maller—4.126 bushels.
12 German scheffela—1 maller—18.145 bus.
1 Vienna metzen equals 1 7-10 bushels.
472.81 Vienna metzens equal 100 qrs.
German centner equals 100 lbs. German.
2032 lbs. German equal 2240 lbs. English.
19 Austro-Hungarian minots equal 4 qrs.
Calcutta linseed is sold per 410 lbs.
Calcutta rapeseed is sold per 416 lbs.
Calcutta poppyseed is sold per 368 lbs.
Calcutta nigerseed is sold per 374 lbs.
Calcutta teelseed, sessame and gingellyseed is sold per 380 lbs.
A French quintal equals 100 kilos—220½ lbs.
180 French charges equal 100 qrs.
217.68 French kilogrammes equal 480 lbs.
225 French kilogrammes equal 496 lbs.

The following American produce is sold by weight and bushel:

Wheat, beans and cloverseed, 60 lbs. per bushel.
Maize, rye and flaxseed, 56 lbs. per bu.
Buckwheat, 42 lbs. per bu.
Barley, 48 lbs. per bu.
Oats, 35 lbs. per bu.
Bran, 35 lbs. per bu.
Timothy seed, 45 lbs. per bu.

In cost, freight and insurance business—

A quarter of California wheat weighs 500 lbs.
A quarter of other American wheat weighs 480 lbs.
A quarter of Chilian wheat weighs 480 lbs.
A quarter of American maize weighs 480 lbs.
A quarter of Danubian maize weighs 480 lbs.
A quarter of Odessa maize weighs 492 lbs.
A quarter of Galatz maize weighs 492 lbs.
A quarter of barley weighs 400 lbs.
A quarter of oats varies from 304 to 336 lbs.
A quarter of rye weighs 480 lbs.
A quarter of beans weighs 480 lbs.
A quarter of peas weighs 504 lbs.
A quarter of lentils weighs 504 lbs.
A quarter of Danubian wheat weighs 480 lbs.
A quarter of South Russian wheat weighs 492 lbs.—*European Exchange.*

Grain Gambling Decisions.

In Chicago, February 27, a decision of interest to the middle men in grain speculation was rendered by Judge Moran in the case of Foote vs. Pierce, assignee of S. G. Hooker & Co., grain commission dealers. The action was to recover on a promissory note for $5,000, which Foote had turned over to Hooker & Co., as settlement of an account growing out of certain dealings on 'Change by the firm for the plaintiff. The difference out of which the suit grew was on the nature of the arrangement, one side contending that the dealing was to be in differences only, while the other side held that regular option deals were understood. The court held that it was not the intention of either that legal or legitimate deals in grain should be made, and that the law made the contract an illegal one. Citing various authorities, Judge Moran remarked that "The broker who receives the money of his principal in payment of losses made by the broker in gambling for the principal in grain is practically and to all intents and purposes the winner of such money. In such transactions the loser knows no other winner than the commission man. To make the law effective, all the penalties it denounces against such gaming must be made applicable to those who most actively engage in its violation. Without the aid of commission men like Hooker & Co., parties like this plaintiff would have little opportunity to indulge in forbidden speculation. The commission men furnish the access to the board; they open the door of temptation, and by agreements such as made in this case, they encourage and actually induce a violation of the law." Judgment was given for Foote for the sum of $7,265.

In St. Louis, on February 28, the Court of Appeals decided that a note given in consideration of a difference in an option deal is not void in the hands of a bona-fide holder, the note having been acquired before maturing and without notice of illegality. This seems to be just the opposite of the decision of Judge Moran, of Chicago.

The American Exchange in London.

Our readers, or many of them, have doubtless heard of the American Exchange in London, the combined banking-house, post-office, reading-room and bureau of information, which was established several years ago for the accommodation of Americans abroad and Englishmen at home. Started as a private business venture, the enterprise grew to such proportions that it became necessary, a couple of years since, to organize it as a company, with a capital of $1,000,000, upon which, it is said, 6 per cent. dividends have been paid from the outset, and more has been earned. It is now proposed to form a similar establishment in Paris under a distinct organization, but practically to be closely associated with the London concern under the same general management. The capital of the Paris enterprise will be $500,000, which Mr. Gillig finds no difficulty in securing from both American and French sources. It will be conducted on the same comprehensive and conservative plan that has proved so successful in London, not only affording Americans all manner of conveniences and comforts while in Paris, but facilitating the commercial and social relations of France and the United States. Speaking of this enterprise, the Springfield *Republican* says: "There is an undoubted field for such an establishment in Paris, the favorite city of American travelers, and, with the prudent administration that long experience has taught Mr. Gillig to exercise, its financial success would seem to be assured."

ONE of the workmen at J. B. A. Kern's mills, named Joseph Magnus, living at 613 Walnut street, sustained severe internal injuries February 16th, while loading a wagon with bags, each containing 200 pounds of flour. One of the bags got caught in the slide leading to the wagon, and when Magnus tried to move it he strained his kidneys so severely that he dropped powerless. Dr. Schorse, who attended the man, pronounces the case hopeless.

NEWS.

Everybody Reads This.

ITEMS GATHERED FROM CORRESPONDENTS, TELEGRAMS AND EXCHANGES

MINNEAPOLIS will soon be lighted by electricity,

WORK on the Artic mill is progressing favorably.

BURNED.—B. McCabes mill at West Lebanon, N. H.

ADAMS & CRAWDEN of Merion, Ind., have sold out to Thos. J. Cushman.

THE St. Paul, Minn. Roller Mill has been idle but four days in fourteen months.

MCMILLIANS' MILL in Winnepeg, Manitoba is to be remodeled to a 400 barrel roller mill.

BURNED.—Henry Torgard's mill at Blair, Wis. Loss $8000. Insured. Mill will be rebuilt.

THE name of the Arctic Mill Minneapolis, has been changed to "St. Anthony Roller Mill."

REPORTS from nearly all portions of Kansas are extremely favorable for a good wheat crop.

THE Steam Planing Mill Co. will build this season a 100 barrel steam mill at Rose Valley, Kansas.

WILKINSON & TOMLINSON of Plainfield, Ind., have dissolved partnership. Moses Tomlinson continues.

DANIEL F. SMITH will commence at once to build a mill of 100 barrels capacity at Benson, Swift Co., Minn.

MESSRS. HUNTLEY, HOLCOMB & HEINE of Silver Creek, N. Y., have discontinued their branch house in St. Louis.

O. H. PRAY the veteran mill furnisher and builder, will it is reported undoubtedly be the next Mayor of Minneapolis.

MESSRS. KEPPEL & DE ROO, millers of Zeeland, Mich., have dissolved partnership. Mr. De Roo retires from business.

J. B. FICKLEN & SONS, proprietors of the Bridgewater Mills, at Fredericksburgh, Va. suspended Feb. 21, with liabilities of $130,000.

THE RECENT RAINS in California encourage farmers in all parts of the state to beleive that they will harvest an excellent crop of wheat.

CHARLES SAHLER a miller got caught in the gearing in May & Webers mill at Watertown, Wis., February 16th and received fatal injuries.

FEB. 23, a terrific boiler explosion occurred in the Vulcan Iron Works, St. Louis, Mo., killing three men and badly injuring several others.

MR. GEORGE A. CHRISTIAN of Minneapolis is contemplating the erection of a 200 barrel roller mill at Grand Forks, Dakota, during the present year.

THE GARDEN CITY Mill Furnishing Co., Chicago, Ill. have made a very large shipment of purifiers and wheat brushes to San Francisco during the past month.

OWEN C. CLARK'S saw, planing and flour mill at Stephens Point, Wis. burned Feb. 21. Loss is said to be about $20,000 with no insurance. The mill will be rebuilt this year.

ON SATURDAY, Jan. 28th, the Blair Custom Mill, owned and operated by H. Thorsgaard, burned, together with about $500 worth of grain. Total loss $6000. Insured for $1500.

W. G. PENNYPACKER & Co. of Philadelphia have made extensive changes in their mill putting in Garden City Purifiers and Wheat Brushes. They are well pleased with the results.

THE CASE MANUFACTURING Co. of Columbus, O. are meeting with gratifying success in introducing their reduction machines. Some of the mills in Milwaukee are putting in these machines.

THE Stilwell & Bierce Manufacturing Company, Dayton, Ohio, have sold one of their Victor turbines to the Crocker Manufacturing Company of Holyoke, and one to H. C. Bowen of Cheshire, Mass.

SOME ST. LOUIS millers recently purchased 100,000 bushels of wheat in California to be ground in St. Louis mills. It is transported entirely by rail at special rates. Part of it has already arrived and the balance is in transit.

A New York inventor claims to have invented a process by which he can force oxygenated air through damp and musty wheat and put it in first class condition for being made into flour at an expense of ¼ cent per bushel.

THE VALUE of the products of flour and grist mills in St. Paul for 1881 is stated by the *Pioneer Press* at $1,006,906, an increase over 1880 of $379,200. The number of mills is six, a decrease of one from the previous year. The number of men employed, sixty-four in all, is five more than during the past season.

INVENTIONS which meet humam wants are now readily adopted in the most unexpected quarters. The telephone has been put into use in Russian Turkestan, where Samarkand can talk at a moments notice to Katty-Kourgan. And yet it is only a few years since that instrument received respectful attention in civilized countries.

THE Garden City Mill Furnishing Co., of Chicago, Ill., are about to establish a manufactory in Canada, so that Canadian millers can get the Garden City Purifiers and Garden City Wheat Brush without paying heavy duties. The company have also made arrangements for manufacturing their machines in Great Britain, Germany and Austria.

A dispatch from Washington says that the Senate Committee on patents gave a hearing to George Wilson, Henry Spendlow, and George W. Watson, of Buffalo, in favor of an extension of the patent they hold for unloading grain from vessels and cars. The Committee took no action, but the members seem to be inclined to report the bill to the Senate favorably.

THE report that unsound flour is being shipped from this city to the East is indignantly denied by our millers. There is a class of unprincipled dealers and traders who send to market bad flour, branded as from St. Louis, and the spurious stuff sells well because of the high reputation of the brand. The trick, however, is always found out, and reacts speedily upon the promoters of the swindle. St. Louis does not ship bad flour to any market. It cannot afford it.—*St. Louis Miller.*

THE Gratiot Bros., now at Platteville, Wis., propose establishing a flouring mill in this city which shall have a capacity of 125 barrels per day. Mr. Chas. L. Gratiot is the inventor of a new vertical rolling-mill device for thoroughly grinding grain. In its operation only three breaks are necessary to reduce wheat to flour and middlings. They are also manufacturers of an improved wheat heater, which is recommended and used by millers everywhere. The gentlemen will find Dubuque just the place for them.—*Dubuque Trade Journal.*

TWENTY-FIVE years ago the great Victoria bridge at Montreal was the sensation of the day. Now this wonderful triumph of engineering skill is about to take a place in the public mind subordinate to the new railway tunnel under the St. Lawrence, which is to have the following dimensions: Entire length, about 21,700 feet; actual length of tunnel proper, 14,930 feet. It is to be 26 feet wide inside, and 22 feet high. It will be lined with brick masonry throughout, exept the fronts, which will have from 20 to 30 inches in thickness, according to the character of the ground to be supported.

Houses built of Cotton.

Of all substances apparently the least likely to be used in the construction of a fireproof building, cotton would perhaps take the first rank, and paper the second; and yet both these materials are actually being employed for the purpose indicated, and their use will probably extend. Compressed paper pulp is successfully used in the manufacture of doors, wall panelings and for other similar purposes, with the result that all risk of warping and cracking is obviated, while increased lightness is attained and the fear of dry-rot is forever banished. Papier-mache, after having served a useful purpose in an unobstrusive manner for years as a material for small trays, paper-knives and other such light articles, has now snddenly assumed a still more important position in the industrial world. A still more sudden and striking advance has been made in the employment of cotton as a building material. A preparation called celluloid, in which cotton is a leading ingredient, has been used lately as a substitute for ivory in the manufacture of such articles as billiard-balls and paper-cutters, and now a Canadian manufacturer has invented a process by which compressed cotton may be used, not merely for doors and window-frames, but for the whole facade of large buildings. The enormous and increasing demand for paper for its normal uses as a printing and writing material prevents the extended use of papier-mache as a building material, for which it is so well suited in so many ways; but the production of cotton is practically unlimited, and there seems to be a large field available for its use in its new capacity as a substitute for bricks — or at least plaster — and wood. Treated with certain chemicals and compressed, it can be made perfectly fire-proof and as hard as stone, absolutely air and damp proof; and a material is thus produced admirably adapted for the lining—internal or external—of buildings of which the shell may or may not be constructed of other material, while it easily lends itself to decorative purposes. — *From Colonies and India.*

MEASURING POWER.—At a recent meeting of the Polytechnic Association of New York city, Mr. John W. Sutton remarked that there were two general systems. One extinguished the power it measured by friction induced for the purpose, and could only be used a short time as a test. The other measured without much retarding, and could in theory be used all the time. The horse power of engineers' parlance is a little more than an average horse can do steadily ten hours a day. It is thirty-three thousand foot pounds per minute. It is 550 pounds lifted one foot high each second. On the transmission system, Mr. Sutton's favorite dynamometer was a pulley connected to the shaft by springs with delicate devices for observing while running exactly how far the springs were deflected to know the strain in pounds, which, being multiplied by the velocity in feet per minute, gives the number of foot pounds per minute. For a crude measurement a belt just able to do the required work without slipping could, with cheap apparatus, be made a test of power. Find by repeated trials just how much strain on a lever of a given length will slip the belt when the machinery is stopped, and we have the strain under which the belt is acting while in use, which, multiplied into the speed, gives the power.

New Zealand Correspondence.

WAITEMATA MILLS, AUCKLAND,
January, 28th 1882.

EDITOR UNITED STATES MILLER!

*** Regarding the milling interest, there is now a considerable number of new machine and machinery in our mills, but none as yet have gone in for a complete set of rollers.—We can do nothing with a low grade of flour in this country,—the millers principally prefering to work one straight grade,—another thing is,—we are out of the way, of having any conversation with those millers who are going in for an entire set of rollers, or the gradual reduction, and I have not yet seen a miller's produce notes from any of those who have adopted the roller system, with a miller's name attached to it as against stone or a gradual reduction. Waste is one of those insidious things that millers have to be on the watch for, and if we run over a pound of waste to a bushel of wheat, it soon tells on the pocket; and, although I have written direct to several millers asking for a produce note, I have not been able to obtain one. I have read with interest the article of Mr. Gray in the UNITED STATES MILLER, on the Roller System and Roller Mills. One great objection is the number of changes, and the sooner a roller mill is made having the desideratum, viz., that would finish without a change, the better. Such would supersede all others, and the work would be less; and if rollers are to supercede stones—of which I have my doubts—this, in my opinion, is the only way they will do so.

We are now in our harvest. The season has been of a varied character—in the Southern portion of the country the want of rain has been much felt, and the crop stinted—while in the northern portion, there has been abundance of moisture, and the crops being harvested are turning out remarkably well. Our wheats here are of a very superior grade and the return per acre, is not unusual up to forty bushels, and over — and the weight per bushel seldom under sixty-four pounds, and frequently runs as high as sixty-eight pounds. I have frequently seen statements published questioning this as being correct—but there is no mistake about it. Of course the genial climate is the cause both of the quality and the return per acre. Our Government and yours have arranged for International Post-office Money Orders now which is a great convenience.

I am Yours truly

JOHN LAMB.

Mistakes of Life.

Somebody has condensed the mistakes of life, and arrives at the conclusion that there are fourteen of them. Most people would say, if they told the truth, that there was no limit to the mistakes of life; that they were like the drops in the ocean or the sands of the shore in number; but it is well to be accurate. Here, then, are fourteen great mistakes: "It is a great mistake to set up our own standard of right and wrong, and judge people accordingly; to measure the enjoyments of others by our own; to expect uniformity of opinion in this world; to look for judgment and experience in youth; to endeavor to mold all dispositions alike; not to yield to immaterial trifles; to look for perfection in our own actions; to worry ourselves and others with what cannot be remedied; not to alleviate all that needs alleviation, as far as lies in our power; not to make allowances for the infirmities of others; to consider everything impossible that we cannot perform; to believe only what our finite minds can grasp; to expect to be able to understand everything. The greatest mistake is to live only for time, when any moment may launch us into eternity.

WET AND DRY THUNDERSTORMS.—A correspondent of the London *Times*, writing from the Transvaal, South Africa, says: "Every afternoon tremendous storms of thunder and lightning burst upon us. These were of two kinds, the wet and the dry. The first is harmless, though noisy; the second exceedingly dangerous. During the dry thunderstorms, which were prevalent toward the end of October, the lightning seemed quite stupefying. It was unaccompanied by either wind or rain. The angry flashes were followed almost simultaneously by awful crashes of thunder, which seemed to shake the earth. One or two tents were struck, and the grass was set fire to in several places within sight of our camps, but no life was lost, only some arms damaged. The dry thunderstorms were soon followed by wet ones. The rain, mixed up with enormous hailstones, soused the thirsty earth, and every little crack on the veldt bore its burden of water to the Vaal, which rose and became impassable."

DEATHS FROM SINGULAR CAUSES.—Two distinguished men have just died in Paris from a singular cause. Col. Adan, Director of the Institute Cartographique, thought he had a chair behind him, and in sitting down fell with all his weight on the floor. He died within a short time from the effect of the accident. About 10 days before M. Pirson, Governor of the Banque Nationale, went to a dinner party at the Spanish Legation, and sat beside the hostess. She rose from the table, and then, continuing a conversation, resumed her seat. M. Pirson followed her example but a footman had meanwhile removed his chair, and in his fall he injured his spine and survived only a few days.

ELECTRIC PURIFIER COMPANY,

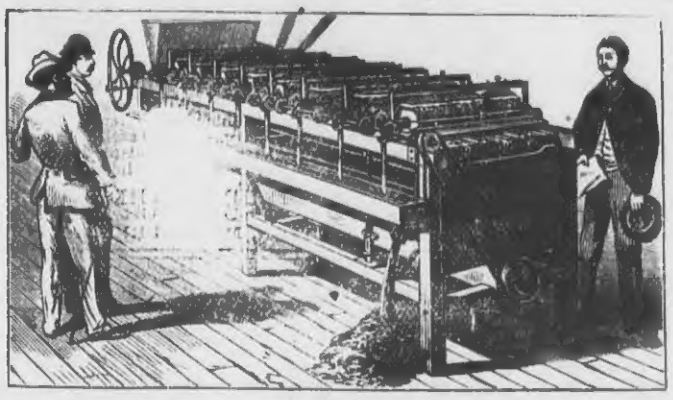
— OF —

New Haven, Conn.

Factory, New Haven, **New York Office, 17 Moore Street.**

This Company was Organized at New Haven on the first of March, 1881, with a Capital of $300,000.

Electric Middlings Purifiers.



HAVING PURCHASED THE SMITH-OSBORNE PATENTS GRANTED BY THE

United States, Great Britain, France, Belgium, Austria and Canada.

The first Machine manufactured was put up soon after the United States patent was granted, in February, 1880, in the *ATLANTIC MILLS, BROOKLYN*, and has been in almost constant practical use since, demonstrating beyond a question that it possesses the following advantages:

It Purifies Middlings Absolutely without Waste.
It Purifies Middlings with Greatly Reduced Power.
It Purifies Middlings with Greatly Reduced Space.
It Purifies Middlings with Greatly Increased Rapidity.
It Purifies Middlings from Spring and Winter Wheat Equally Well.
It Purifies Middlings with the Best Results.
It Dispenses with the Use of Air Blasts.
It Dispenses with the Use of all Dust Houses.
It Dispenses with the Use of all Dust Collectors.
It Dispenses with the Dangers of Explosion and Fire.
IT PURIFIES DUST HOUSE MATERIAL OF ALL KINDS.
IT PURIFIES THE FINEST MIDDLINGS OF ALL KINDS.
It is Remarkably Adapted to Custom Mills.
It is Excellently Adapted to Manufacture Farina.

WHERE THE ELECTRIC PURIFIERS MAY BE SEEN IN OPERATION:

Atlantic Mills, Brooklyn, N. Y.; Archibald Schurmeier & Smith, St. Paul, Minn.; F. L. Johnston & Co., St. Louis, Mo; Washburn, Crosby & Co., Minneapolis, Minn.; Norton & Co., Chicago, Ill.; Sanderson & Co., Milwaukee, Wis.; M. C. Dow & Co., Cleveland, Ohio; James K. Hurin, Cincinnati, Ohio; Mosely & Motley, Rochester, N. Y.; Chas. Tiedman. O'Fallon, Ill.; Lyman & Co., Norfolk, Va.; Texas Star Flour Mills, Galveston, Texas; Zenith Milling Co., Kansas City, Mo.; C. Hoffman & Son, Enterprise, Kansas; Richter & Co., Williamstown, W. Va.; Kinney & Hobart, Burrton, Kansas; Parkville Milling Co., Parkville, Mo.; Norton & Co., Lockport, Ill.; Ballard, Isom & Co., Albany, Oregon; Niedhammer & Walton, Buena Vista, Ind.; Kimberly & Clark Co., Appleton, Wis.; Cyrus Hoffer, Lewisburg, Pa.; Roberts & Briggs, Seneca Falls, N. Y.; Phillips & Thomas, Kennedy, N. Y.; Hillsdale City Mills, Hillsdale, Mich.; Susong, Logan & Co. Bridgeport, Tenn.

SOMETHING NEW.

A Combination Electric Purifier—A Complete System of Three Purifiers in One.

Samples of work will be sent upon application, by mail, and all inquiries answered from the New York Office. Parties contemplating building new mills, or reconstructing old ones, should see the superior working of the ELECTRIC SYSTEM before making contracts for Purifiers elsewhere.

JOHN RICE,
General Manager.

No. 17 Moore St., NEW YORK.

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Manufacturers and Agents for the Northwest.

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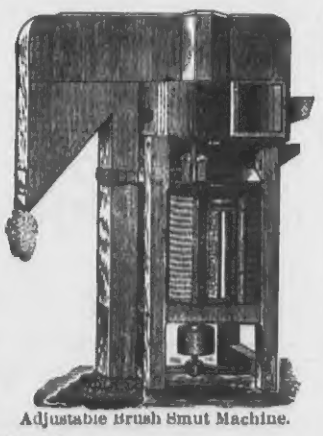
LOCKPORT, N. Y.,

— Manufacturers of —

RICHMOND'S CELEBRATED

Smut Machines,
Brush Machines,
Grain Separators,
and Bran Dusters.

Nearly Two Hundred of these Machines are now in operation in the city of Minneapolis, Minn., alone, and more than sixty in the city of Milwaukee, Wis. They are also extensively used in many other sections, both on Winter and Spring Wheat.



Adjustable Brush Smut Machine.

SEND FOR DESCRIPTIVE CATALOGUE.

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—BUILT BY—

WM. A. HARRIS, Providence, R. I.

Built under their original patents until their expiration. Improvements since added: "STOP MOTION ON REGULATOR," prevents engine from running away; "SELF-PACKING VALVE STEMS" (two patents), dispenses with four stuffing boxes; "RECESSED VALVE SEATS" prevent the wearing of shoulders on seats, and remedying a troublesome defect in other Corliss Engines, "BABBITT & HARRIS' PISTON PACKING" (two patents). "DRIP COLLECTING DEVICES" (one patent). Also in "General Construction" and "Superior Workmanship."

The BEST and MOST WORKMANLIKE form of the Corliss Engine now in the market, substantially built, of the best materials, and in both Condensing and Non-Condensing forms.

The Condensing Engine will save from 25 to 35 per cent. of fuel, or add a like amount to the power and consume no more fuel. Small parts are made in quantities and inter-changeable, and kept in stock, for the convenience of repairs and to be placed on new work ordered at short notice.

NO OTHER engine builder has authority to state that he can furnish this engine.

The ONLY WORKS where this engine can be obtained are at PROVIDENCE, R. I., no outside parties being licensed.

WM. A. HARRIS, Proprietor.

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A PURIFIER

That fills all the demands of modern milling.
That is subject to the most complete control possible.
That gives double the capacity of any other in the same floor space.
That has two Screens, each with its own Feed Bar, and each falls off.
That has the best (patented) ever used on a Purifier.
That has the most thorough control of the blast.
That has the most convenient method of "cut-off."
That has absolutely the best cloth cleaner (patented) in use.
That has the perfection of cloth tighteners used while running.
That is made either single or double, (double principle patented).
That carries 25 to 90 square feet of bolting surface, against 13 to 45 in others.
That costs no more, nor as much as others with half the capacity.
That has its bearing boxes detached from the wooden frame.
That renders them fire-proof. These are recent and important attachments.
That do s its work "not absolutely without waste" BUT WELL.
That has no screw conveyor or gear wheels to absorb power, but
That has many new and important devices, convenient and simple.
That does not infringe any patent, (can convince any one of this).
That is not an experiment, but has been tried and tested by hundreds.
That is in use from Long Island to San Francico, from Dakota to Texas.
That not one of which has ever been returned by any miller.

These are some of the things we have to say about the Case Purifier, and if one jot or tit of them is found to be untrue, we will take the machine back and pay all expenses, including freight both ways. Can fill orders promptly. Address

CASE MFG. CO., Columbus, Ohio.

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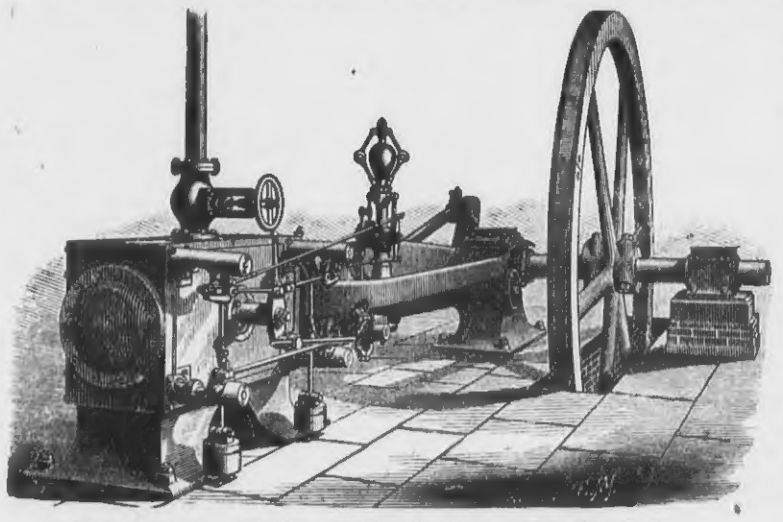
Will Replace Ordinary Engines Guaranteeing to Save One-Third Fuel.



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We Build **The Best Farm Engines and Small Engines** for warehouses and elevators.
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As nearly absolute safety as is possible to be attained. Sure connections in UNION DEPOTS, at all important points. No change of cars between CHICAGO, KANSAS CITY, LEAVENWORTH, ATCHISON or COUNCIL BLUFFS. Quick journeys because carried on Fast Express Trains. Day cars that are not only artistically decorated, but furnished with seats that admit of ease and comfort. Sleeping cars that permit quiet rest in home-like beds. Dining cars that are used only for eating purposes, and in which the best of meals are served for the reasonable sum of seventy-five cents each. A journey that furnishes the finest views of the fertile farms and pretty cities of Illinois, Iowa and Missouri, and is afterwards remembered as one of the pleasant incidents of life. You arrive at destination rested, not weary; clean, not dirty; calm, not angry. In brief, you get the maximum of comfort at a minimum of cost.

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At reduced rates, good returning, until October 31st. Also to San Francisco, for parties of ten or more, good for ninety days, at great reduction from regular fares.

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E. ST. JOHN,
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C. F. MILLER, of Mansfield, Ohio, representing John T. Noye & Sons, is prepared to furnish Roller Mills complete of any desired capacity.

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